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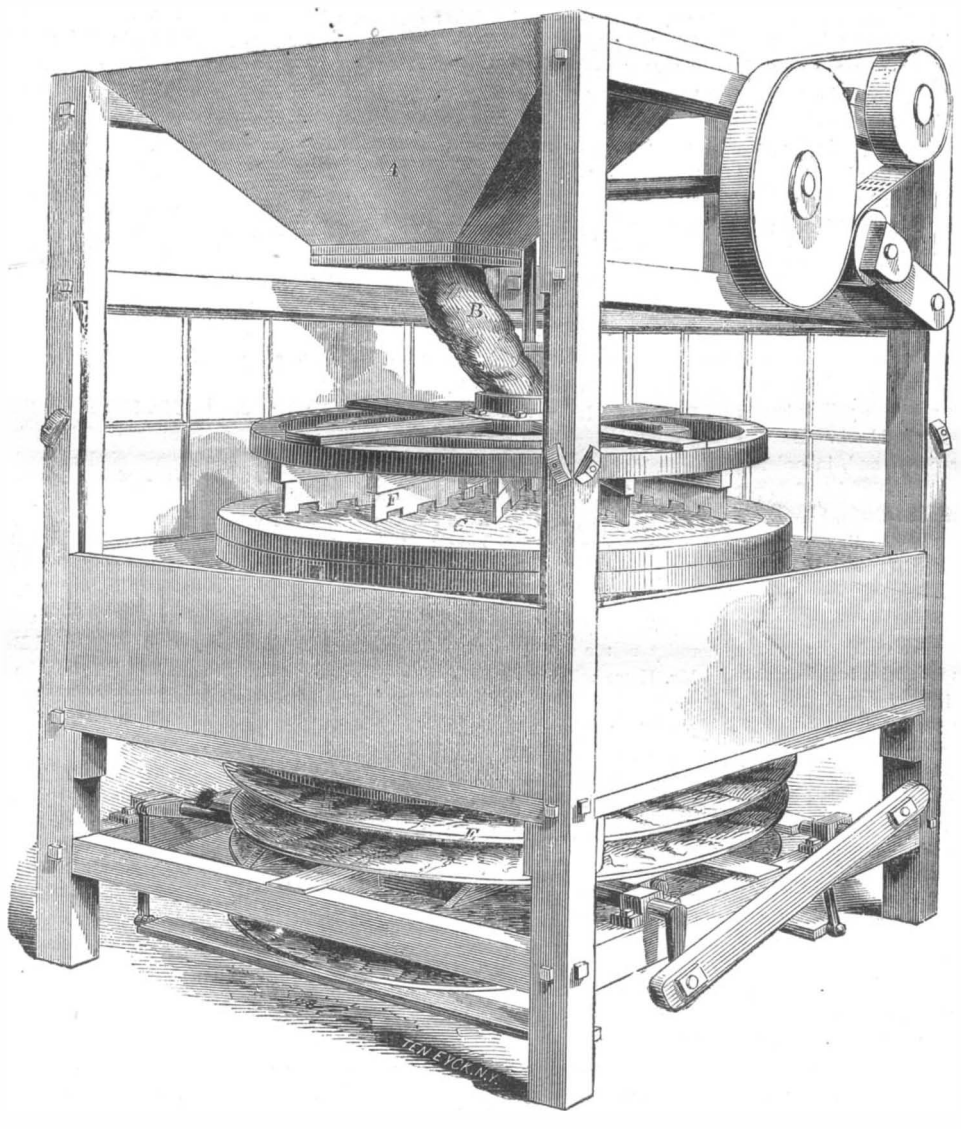
## IMPROVED GOLD SEPARATOR.

There are two principal operations in separating gold from the quartz matrix in which it is found, the first is the pulverizing of the quartz, the second is the separating the metal from the powder. The proportion of the metal to the stone is exceedingly small. In some quite rich quartz the workmen never see a particle of gold until the last operation, so finely scattered is it through the rock. As we have recently explained, the usual mode of separating is by amalgamating the gold with mercury in connection with a current of water which washes away the refuse matter. This is a wet, disagreeable, and expensive operation. A plan has been invented by Wm. Oland Bourne, of this city, for effecting the separation by an entirely dry process, by the action of a current of air, without either mercury or water. This invention is illustrated in the accompanying engraving.



BOURNE'S IMPROVED GOLD SEPARATOR.

The pulverized auriferous quartz is fed into the hopper, A, whence it passes down through the leather hose, B, upon the cloth surface of the seive, C Here it meets with an upward current of air, produced by the double-acting bellows, E. This current being forced through the sieve, C, acts upon the powder of combined quartz and metal, raising the lighter material and allowing the heavier to fall upon the surface of the sieve. The upper portion of the stratum of powder resting upon it is constantly scraped off over its periphery by the revolutions of the radial scraper, F. When as much gold has been separated from the principal bulk of the quartz as the experience of the operator decides, the sieve is drawn out from the frame, and the gold brushed off into a receptacle for a further operation to remove the remaining impurities with which it is still mingled. The machine is provided with a sash enclosure surrounded with a box of glass panes, and is covered with a cloth sheet to confine the dust.

The main feature of this invention is the production of an even upward blast over the whole surface of the seive, whereby particles of given weight are never carried beyond a determined hight. The force of the blast is made adjustable, and by this means it is thought that, with experience, all, or nearly all, of the gold, however fine, may be separated from the great bulk of the pulverized quartz with which it is mixed.

The patent for this invention was issued, Nov. 24, 1857, to William Oland Bourne, and persons desiring further information in relation to it will please address the Humboldt Mining and Manufacturing Company, Box No. 3,892, Post-office, New York.

## VIOLINS.

The fiddle produces more sprightly tones than any other instrument, but why it does so, no person has yet been able to afford a satisfactory explanation. When and where the violin was invented is a matter of dispute. The ancient psaltery, like the harp, was struck by the fingers; and probably the first fiddle was played upon in a like manner. Some have supposed that the fiddle was originally invented in Greece, in the days of her musical glory, and that it was also known in Rome during the state of its highest civilization, then afterwards lost during the dark period succeeding the Gothic invasions, and then subsequently re-invented in France in the ninth century. From some figures which have been found in ancient Roman sculpture we judge that the violin, in a rude form, was used in Italy as early as the days of Augustus Cæsar, and that, although civilization was overthrown by the barbarians, this instrument was still used by the peasantry of that country in their dances. In the days of chivalry, the Troubadours played upon the old French *rebec*—a fiddle with three strings, but although this instrument was the delight of lords and ladies gay in court and camp, we have no doubt that at that very time the peasantry in Alpine hamlets enjoyed a far higher style of music and employed much superior instruments. It is a matter of history that the Italians were the earliest master-fiddlers in the world, and they are the most exquisite professors of the *bow* yet. In the sixteenth century, Cremona (a town of Lombardy, in Italy) became famous for the violins made in it by a family named Amati, who gave to the violin its present form, and seem to have stamped perfection on the instrument. The violins made by this family are called "Cremonas," and those which survive to the present day are worth far more than their weight in gold. They have not only baffled every attempt to improve them but even to equal them in tone. It has always been a subject of intense desire on the part of violin makers to find out the secret of superiority in the "Cremona." Old fiddles have been taken to pieces and their exact form and size copied with the utmost fidelity, and yet failure has attended all such efforts. It has been said that age contributes to increase the brilliancy of the violin's sound, but age is not the sole secret of the superiority of one fiddle over another. It was asserted that the old makers of "Cremonas" were exceedingly careful of the wood which they selected. They used only that which was obtained from old buildings that had been kept dry for centuries. The character of the wood used is no doubt an important object, but not the only one for instruments; other things are equally necessary to success, and none more so than the varnish. The best varnish for this purpose is that made with amber and oil. The amber is heated in an iron vessel in the same manner as gum copal, then hot linseed oil is poured upon it and the whole boiled until the resin is completely dissolved. It is believed that this was the varnish employed by the "Cremona" makers. It takes quite a long time to dry, when applied to a violin; but it afterwards richly repays, with its gay tones, the patience expended in waiting for the best period of its song.

New violins are greatly improved in tone by being hung up for some months in a dry place, and played upon every day by a good performer. This is due to the law of sympathetic vibration being fulfilled. When a flute is sounded in the same room with a piano, the notes of the former will cause the strings of the piano to vibrate. By the same law of musical sympathy, one stringed instrument, such as a fiddle, when played upon, will make the strings of another, especially when hanging freely, vibrate in unison, but on a diminished scale. Guided by this law, new violins are much improved in tone by subjecting them to the influence of harmonious vibrations, produced upon their own strings by playing, and also by being hung up in a dry room where good performers are accustomed to execute music.

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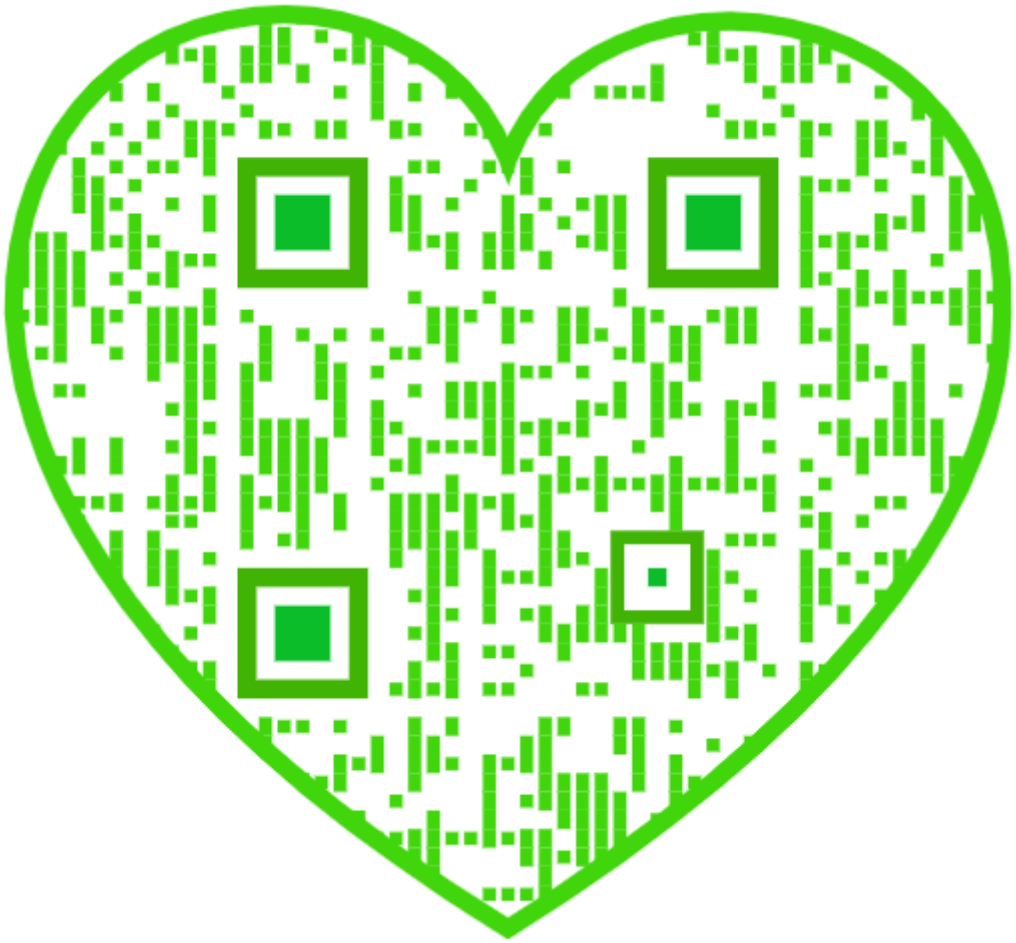

## POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

In our last issue, we published Professor C. Mason's interesting paper on the subject of "Zinc," read by him at the regular meeting of the above association, in their room in the Cooper Institute, this city, on the 26th ult.; but we were compelled to defer, until this number, the publishing of the subsequent and equally interesting

### DISCUSSION.

Mr. Seely said:—"The mention of Paracelsus, by the president, reminds us of alchemy, of which Paracelsus was the great apostle; he made it his sole business to search for the philosopher's stone and the *elixir vitæ*; he is reputed to have discovered the latter and to have used it himself, and yet he died young. The ore of zinc called 'calamine' was very nearly what the the alchemists imagined to be the philosopher's stone; they melted copper with it, and, to their minds, the copper was transmuted into a metal nearer like gold. Had Paracelsus produced that species of brass we call 'oreide,' the people of his time would not have doubted that he had really found in calamine all that he sought, for the modern oreide satisfies their notions of gold. Brass, until 80 years ago, was made by the ancient process of melting (in a crucible) copper mixed with charcoal and an ore of zinc. At present, we first melt one of the metals, then add the other. If copper be melted first, zinc in lumps is put in, and held under the surface; if zinc is melted first, copper is gradually added, finely granulated or in shavings or turnings. If you try to melt both at the same time, the zinc will volatilize, carrying away heat, and the copper will not melt till the zinc has nearly all escaped—it is like trying to melt ice and lead at the same time. The properties of brass are measured by the proportion of zinc and copper—the more zinc, the whiter, more brittle and more fusible; the more copper, the darker, more malleable and heavier. Half-and-half gives Prince's metal; zinc to copper as 1 to 2, or 2 to 3, gives common yellow brass; a greater excess of copper gives pinchbeck. Brass is not so malleable and ductile as copper; and, in order to get very thin brass or fine wires, sheets or wire of copper are covered over by a skin of brass, and then hammered or drawn out. Copper is brassed by plating or by exposure to fumes of zinc. Metallic bronze powders are brass foil of a great excess of copper made fine by grinding; the various colors are produced by heat. Brass does not remain uniform in successive meltings; it loses its zinc; the smoke about brass foundries is the oxyd of zinc. A little lead in brass improves it for turning. Zinc is strongly affected by heat; a little above the boiling point of water it becomes quite malleable, and may be rolled extremely thin; about 600°, it is so brittle as to be easily pulverized; at 800°, it melts, and begins to evaporate; and at a higher heat it will boil. The useful ores of zinc are the oxyd, the carbonate, the sulphide and the silicate; and their values are in the order named. The first two require only heating with coal to reduce them; the sulphide must first be roasted to drive off sulphur and convert to oxyd; and the silicate requires that the silicic acid, silex and quartz be taken away—a thing not very easy. Thus, it appears that the ores must first be converted to oxyd before any metal is reduced; and when the metal is reduced, the heat converts it into vapor. In short, zinc oxyd mixed with coal is put in a retort, and the zinc is distilled off."

Mr. Seely then illustrated, by drawing on the blackboard, the forms of retorts (gas retort shapes, tubular and crucible) used in Germany, France and England.

Professor Mason remarked that, in treating of the metals, very little had been said about extracting them. He added that the silicate of zinc was no more costly to extract than white carbonate. Specimens of vitrified substances for fancy iron work had been produced; but something substantial, beautiful and ornamental might yet be brought forth for coating the walls of houses, iron columns, girders, &c.

Mr. Stevens, upon request, illustrated by diagrams the American mode of collecting white oxyd of zinc, called the "bag process." It was manufactured at about two cents a pound.

Professor Mason alluded to the competition manifested in the French and American white oxyd of zinc. He added that, in the manufacture of white lead, Satan apparently had as much to do with it as the Maker, from the number of deaths which its poisonous qualities produced Its manufacture formerly was exclusive; it was even now so adulterated that a dealer told him he could trust only one house for this as well as zinc-white. The zinc-white of France is twice as costly as our own, but it is far superior; and, in both cases, the supply can hardly keep pace with the demand.

Dr. Gould had noticed, in soldering silver, that it always left a rough, broken margin, owing, probably, to the fact that silver was alloyed with copper and a little zinc; that the zinc fused at 700° and copper at 1,900°, and thus the zinc volatized, causing the roughness; and he asked whether anything could be proposed to prevent it?

Dr. Stevens answered that zinc, with a certain part of alumina, formed the best solder, and the zinc would volatilize; but it required care to avoid submitting it to too great a heat, or carrrying it to too great a length of time. It is remedied somewhat by a species of flux—by balsam of copaiba, instead of borax or resin. He could not give the reason. He added that zinc and lead paints were generally adulterated as other articles in commerce. For instance, flour was adulterated with barites to make it weigh heavy; plaster-of-paris, by the sulphate of lime. So with medicines and drinks; so, also, with furs that are made in factories. Names are given to animals of which dictionaries are dumb. The *fitch* marten, the *English* bear, and (stranger still) the *Siberian* wolf are examples. In an ounce of cochineal, there are hardly 20 grains that are pure; could it be wondered at, then, that paints were adulterated?

Professor Mason said that at the last fair of the American Institute, a zinc water pipe was exhibited and recommended.

Mr. Garvey said the pipe was very superior in workmanship, and was the first specimen of solid zinc pipe; it was not crystalline, but malleable; attached to it was a bathing apparatus complete. He would seek for further information concerning it.

Professor Mason was informed that block tin was sometimes alloyed and adulterated with zinc; was it practicable? Professor Draper and himself, aware of this fact, had fitted-up these pipes to convey water from a spring to their houses. In a few weeks the water would not run; it was examined, and the water was found to ooze like perspiration through the whole length of the pipe in the ground. Perhaps it could be accounted for by the alloy of zinc in the block tin occasioning the porosity of the metal.

Mr. Howe believed that tin was a poor metal for water pipes.

Mr. Montgomery advocated the adoption of wooden pipes, on account of their cheapness, non-conducting quality, and the fact that they were not likely to be affected by congelation. New York had made a retrograde step when it abolished the log pipes of the old Manhattan Company.

Mr. Garvey had recently seen pipes coated on the inside with a mineral substance which rendered them impervious to water, and which had the same degree of expansion as the metal, and was not likely to peel off. In wooden pipes, the grain of wood is such that it splits, and the outer surface would rot from moisture; but it might be coated with silica.

Mr Montgomery referred to wooden pipes which, after being in use for 60 years, were as good as new. Lead pipes should be abolished; the more pure the water, the more fatal the lead.

Mr. Howe suggested that J. F. Green, of this city, had a material for safely coating any kind of metallic pipe.

Professor Mason then suggested the question of the qualities of brass and its alloys.

Professor Tillman said:—"In making brass, the reason of zinc and copper uniting is not altogether known; it might be owing to the atomic weight, thus: zinc being 32.00, copper 27.22. The great characteristic of zinc is its expansibility, and it dissolves more readily than any other metal."

Professor Hendricks remarked that mercury had a uniting tendency with tin, and that it alloyed very readily.

Dr. Stevens stated, by request, that the sulphate was the poisonous quality in zinc, and therefore its pernicious use in water pipes.

Professor Mason said:—"There is no objection to mixing brass with iron, because the former is specifically heavier than the latter.

Mr. Johnson said:—"Alloy brass with Franklinite, and it hardens it, and is malleable and ductile. In reference to solder, a dentist in this city uses a solder which presents a certain temperature and color, and to use properly it is melted quickly and leaves a smooth surface.

Mr. Seely:—"The equivalent of alloys in brass are about the same; upon the alloy depends the quality of the brass. Prince's metal has equal parts. The difference of temperature makes the alloys unite very readily. A good copper wire has been exhibited by putting it in the fumes of zinc. Copper sheet is brassed by a kind of cementing process, as in steel, or by putting it in an atmosphere of zinc vapor, and brassing the surface only."

Professor Hendricks said it was almost like the method employed in New England to make brass watch-chains look like gold.

Professor Mason said that 60 of zinc and 40 of copper made good brass.

Dr. Tying said, in reference to water pipes, that glass pipes had been used very successfully and healthfully in several cities, and cost less in proportion than wood.

Mr. Montgomery had manufactured glass pipes, but preferred wood, whatever kind it might be.

Professor Mason attributed the death of thousands to paralysis, caused by the lead pipes. He had lost several personal friends, he believed, from this cause.

Mr. Seely asked for information about chrome zinc.

Professor Hendricks said that there was a supposition of chrome yellow, and a very fine color.

Mr. Garvey said that the metal in question had been used for imitating "intaglio." Yellow was obtained, also, from the vegetable kingdom.

Mr. Seely had heard nothing but praise of zinc-white; but painters said it did not spread easy or color well. An artist of Paris had put it on canvas, and after a few months it peeled off.

Mr. Howe had found zinc-yellow to be deficient to chromate of lead, but the first has improved of late. He regarded zinc-white as the most durable and useful of colors.

A painter testified that a coat of white lead gave a good appearance, but zinc-white went under the wood, and it required four coats to equal the appearance of two coats of white lead. The reason of its peeling-off was that the first coat was not dry before the second was put on. He had tried Belgium, Pennsylvania and Lehigh; but he preferred the last. He had known many workmen in white lead to have lost their hands and arms by paralysis.

Professor Mason deferred reading the practical report on "Franklinite," and moved that the subject of "Lead" be taken up at the next meeting. This resolution was carried, and the association then adjourned.

## APPLICATIONS FOR THE EXTENSION OF PATENTS.

*Printing Press.*—Alva B. Taylor, of Newark, N. J., has applied for an extension of a patent for a printing press, granted to him April 4, 1846. The petition is to be heard at the Patent Office on the 2d day of April, next. The testimony closes on the 21st of February.

*Bank Lock.*—Joshua H. Butterworth, of Dover, N. J., has applied for the extension of a patent granted to him for a bank lock on April 11, 1846. The case is to be heard at the Patent Office on the 2d of April, next. The testimony closes on the 19th of March.

*Clover-hulling Machine.*—Martin S. Mansfield, of Ashland, Ohio, has applied for the extension of a patent granted to him for a clover-hulling machine on June 6, 1846. The case is to be heard at the Patent Office on the 21st of May, next. The testimony closes on the 7th of May.

POISONED PARTRIDGES.—The *Springfield Republican* says:—"Patridges are beautiful and delicious birds, and may be eaten with safety as long as their fall food lasts, But when the severity of the winter comes on, they are driven to feed on the young buds of the apple and birch trees and the leaves of the laurel. It is probable that at this season of the year, there cannot be a partridge killed which has not eaten large quantities of the laurel leaf. This leaf is a virulent poison to the human system, though the partridge eats it with impunity to itself."

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## OUR SPECIAL CORRESPONDENCE.

PRAIRIE ROADS, PAPER CITIES AND PACIFIC RAILWAYS—WYANDOTTE WARRIORS AND WHITE WOMEN—STEAM SQUIRTS.

MESSRS. EDITORS:—From Lawrence I went per stage to Wyandotte City. During about three or four months of the year a somewhat uncertain river navigation can be carried on between these two towns, but, practically, the major part of the communication must ever be by land. The Kansas river can never be depended on as an artery through which can flow the steady stream of commercial circulation. The prairie road, over which the stage passed, was by no means so good as some others I have seen. The stone out-cropped so frequently as to make it excessively rough and unpleasant. These prairie roads, formed only by the passage of vehicles over them, are, when the weather is dry and not too dusty, pleasant means of communication; but when used much in rainy seasons, they are perfectly abominable—wheels sinking to the naves, and horses fetlock deep in that tenacious mire which is only to be found in a western prairie. The section of country through which runs the road in question, possesses abundant means for macadamizing it; but there are so many things always to be done in new countries, that many a long day must elapse before art will render these natural highways independent of the weather. The settlers find, as a general thing, that the stone of this region is not well adapted to building chimnies; being limestone, it is too readily affected by the heat. Brick is frequently used for this purpose, and this combination of brick and stone has rather an odd appearance. In parts of Mexico they carry the thing still further, for they work up small fragments of brick, stone and coral into the walls of their buildings, perfectly regardless of the rules of "Flemish" or "English bond," in a way that would give some of our methodical workmen a fit of the horrors; yet, like many similar (as far as the rubble nature of the work is concerned) structures in the Old World, owing to the excellent nature of the mortar used, they have resisted for centuries the destroying hand of Time.

Kansas is flooded with "paper cities"; speculation has been turned from the land into making towns, and it has done it with a vengeance. There are cities here with fine names and well-laid-out streets (on the *map*) that it would puzzle any one to find on the ground. It would take a country five times as large as Kansas to support all the "burgs," villes" and "cities" that, fungus-like, now cover her surface—in imagination. There is quite an extensive bridge (wooden, of course) over the Kansas river, not far from Wyandotte; I should not be surprised if it gets swept down some day, for floods rise rapidly here, and the bridges are rather slim affairs. I have crossed some already that made me breathe very freely—when I got off them. Several of the bridges through the territory have already parted company with the abutments, and set out to see the world for themselves.

Wyandotte City is situated just at the confluence of the Kansas and Missouri rivers, and has, I think, the best natural commercial site on the river. It has, however, to contend against some disadvantages, the chief of these being its contiguity to so many other "cities," several of which had the start of it in the great race for trade. Leavenworth, distant some 23 miles, and Kansas City (in Missouri) quite close, are its most dangerous rivals. As regards the other numberless towns more or less distant from it, it will have to kill them or they will kill it. It is not a little amusing, at times, to hear western men battling for their respective "villes." If we are to believe the disputants, each man's favorite is an earthly paradise and the nearest "jumping-off place" for the celestial regions!

I think that the natural route for the great western railway (as I intimated in a former letter) ought to be up the Kansas river; the settlements are extending westward along it faster than anywhere else. The line, when once made as far as the Pike's Peak gold-diggings, will not have a very great way to be extended before it will reach the settlements stretching out from the Pacific; and towards these gold diggings the most important lines of the territory must extend. Northern and southern lines, though necessary as local roads, will never claim the same attention (from the great cities of the East) that any line that promises to be *the* long-spoken-of and long-expected Pacific Railway most undoubtedly will. It is only as being one of the termini of the (practically speaking) Kansas link of the great chain binding the Atlantic and Pacific coasts that Wyandotte is brought into notice; and if she is wise she will strain every nerve to secure the end of that link before some other more northern town (St. Joseph, for instance) secures it, through a less favorable country, for itself. A line has been surveyed from the mouth of the Kansas river, following the valley up as far as Fort Reilly—a distance of 132 miles; and the rise of the grade line at that point was only 309 feet above the starting place at Wyandotte. The alignment is also said to be highly favorable. There might possibly be some trouble from high water if the grade was kept close to the river, but it is said that provision has been made for that emergency.

The tribe of Indians from whom Wyandotte City takes its name are tolerably well civilized. Some of its members own fine houses in and about the place, hold responsible positions in the community, and—last though not least—marry *white* women. They (the "warriors," not the women) possess the right of voting, having stipulated with the government to that effect before their treaty. Steam can never be used in Wyandotte City as a means of locomotion, the grades being necessarily too steep for its employment; the ascent from the river is very abrupt.

Another stage ride (through the Indian Reserve for the most part) brought me to Leavenworth, where I had the unexpected pleasure of getting very wet and very tired, working at an extemporary bonfire that some handy individual managed to make out of four frame houses. The firemen have about 500 feet of leading hose to one engine and a mere trifle to the other—a worthless machine, too, by all accounts; and as the distance of the fire was at least double that length from the river, they had to draw their supply of water from a *wet cellar!* That soon gave out; then we had to pass water from the river in buckets—a duty in which some gentlemen by no means distinguished themselves, though some ladies (to their honor be it spoken) did. It was well for Leavenworth that the night was calm; otherwise, with that miserable "apparatus," half the town might have been laid in ashes. What the citizens there have lately lost by fires would buy them several steam fire-engines, and build some water tanks besides! They could not invest money to better advantage than in some of A. B. Latta's or Lee & Larned's "steam squirts." But some people will only learn of that harshest of all schoolmasters—Experience.

E. M. RICHARDS.

Leavenworth City, Kansas, Jan. 28, 1860.

## METEOROLOGY IN THE CELLAR.

MESSRS. EDITORS:—This morning (Feb. 3, 1860) on going into my cellar for a scuttle-full of coal, I discovered a phenomenon as surprising as it was interesting to witness. It was a snow storm on a small scale. The thermometer ranged 4° below zero out of doors, and I should judge the temperature of the cellar to have been between 30° and 35° The window sash of the cellar holes did not fit tight against the casings, and through these apertures the zere cold atmosphere made itself visible in its ingress by transformation into cloud as it mingled with the warmer air in the cellar. All around this little cloud there were snow flakes to be seen. Some fastened themselves into beautiful festoons on the cobwebs of the ceiling; others on to projecting lumps of coal in the form of brushes; and some were flying about promiscuously from the varying forces of the mingling currents that met inside the window sash. The crystallization or freezing of the vapor could not be perceived within the cloud. It was evidently so minute as to be imperceptible to the naked eye, until it had aggregated upon some nucleus in contact with the little cloud. The action of the commingling vapors—cold and warm air—indicated considerable *effervescence*, apparently; something more than the mere agitation of two currents meeting in contact. My inference is that it indicated chemical action, something like the effervescence of two substances in chemical action and producing a third. I thrust my hand into the cloud and could not discover a change of temperature between its inside and outside, except when I put it near to the aperture where the zero cold air was passing in. Upon going up stairs and out of the house, and thence into a little closet, I found the phenomenon, in a more active state, going on between the slats of the door blind. Here the flakes were flying more profusely; so much so as to attract the attention of any one walking past on the outside, by seeing the snow flying about their ears. Nature sometimes reproduces, on an almost infinitessimal scale, phenomena which are commonly displayed in works of magnitude.

JOHN WISE.

Lancaster, Pa., Feb. 3, 1860.

## RADIATION AND ABSORPTION OF HEAT BY THE EARTH.

MESSRS. EDITORS:—The above subject having been much discussed here, lately, we have constructed an instrument which is capable of demonstrating it by practical experiments. Two couples of hollow globes are united, each by a vertical tube about 4 feet in length with an $\frac{1}{8}$ of an inch inside diameter. The two globes at the bottom are then united by another tube of any size, and the two on the summits also are united by a horizontal glass tube an $\frac{1}{8}$ of an inch inside, and vertically bent down at each end, so as to stand on the top of said globes. Two cones or hats of straw are then provided, full 4 feet high each and about two feet wide, which are set—one the large end down surrounding one side of the apparatus, so as to keep said side under the influence of the radiation of heat from the earth only; the other cone is set around the other side of the apparatus, with the large end upwards, the under connection pipe passing through a hole made in the pointed end of the cone. The effect of this is to prevent said side of the apparatus from receiving any heat from the earth, but it is enabled to receive the heat from the atmosphere or from the sun.

The apparatus being filled with alcohol, the upper connection pipe alone being left empty, it soon begins to work; the resulting difference of temperature of the two columns of alcohol having the effect of elevating the level of one higher than the other, and to cause it to flow through the horizontal glass pipe which unites them. The second column, however, permanently discharges itself into the former through the lower connection pipe, and thus a continual stream or current is produced which lasts as long, in one way or the other, as the earth is radiating or absorbing heat. A difference of 0.1 of a degree is sufficient to produce the phenomena, so that the instrument is seldom at rest or only for a short time. This instrument was first constructed with two globes only, like two thermometers connected at their extremities; but then it was found not to work. There is no doubt an immense amount of waste power in the radiation and absorption of heat by the earth, which may be brought to use in some future time.

I send you this communication, thinking that you might judge it interesting to a numerous class of the readers of the SCIENTIFIC AMERICAN.

E. R.

Ottawa, Ill., Feb. 11, 1860.

## AN IMPROVED WEIGHING SCALE WANTED.

MESSRS. EDITORS:—Yours being the only proper medium, I would suggest your calling the attention of inventors to the wants of a weighing scale for family use. The steel-yard has many inconveniences, especially in attaching articles to be weighed; for instance, a cheese, a plate of butter, and a great number of other articles. They are also very liable to become crooked, and the pivots soon become so much worn that no reliance can be placed on them. The strength required to hold them up at a proper position for use is also highly objectionable, and the ordinary spring balance is, if anything, of still less worth. A scale with a pan, of tolerable accuracy, occupying as little room as possible (to answer the purpose), and that could be sold cheap, is much needed by mechanics and farmers in every section of the country.

H. F. N.

New York, Feb. 10, 1860.

KEEPING HORSES' FEET AND LEGS IN ORDER.—"If I were asked to account for my horses' legs and feet being in better order than those of my neighbors', I should attribute it to the four following circumstances: First, that they are all shod with few nails, so placed in the shoe as to permit the foot to expand every time they move; second, that they all live in boxes, instead of stalls, and can move whenever they please; third, that they have two hours daily walking exercise when they are not at work; and fourth, that I have not a head-stall or rack-chain in my stall. These four circumstances comprehend the whole mystery of keeping horses' legs fine, and their feet in sound working condition up to a good old age."—*Miles.*

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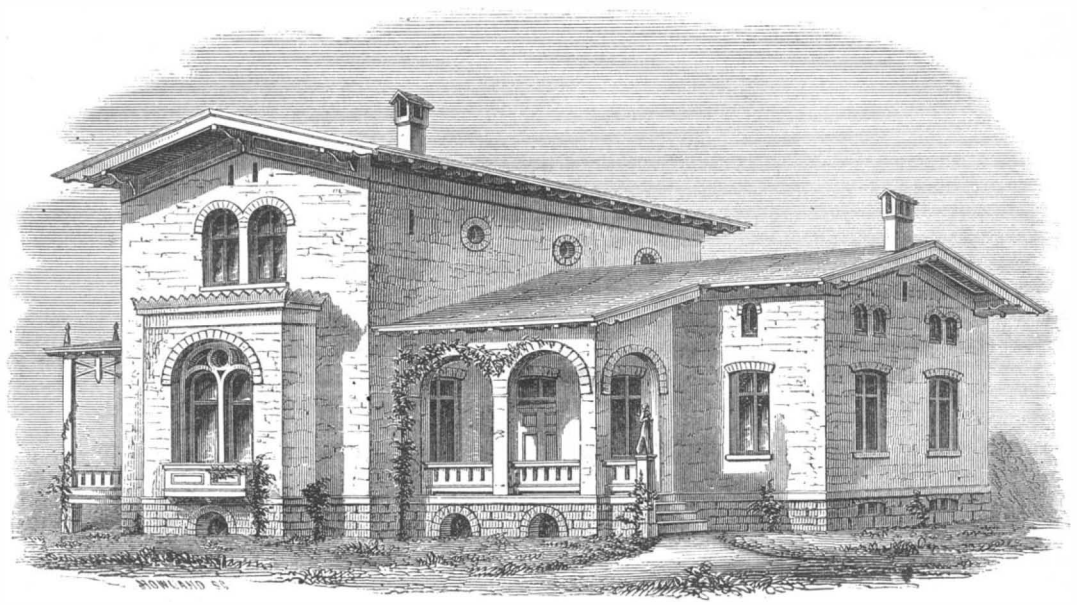
## THE PLAN OF A COUNTRY HOUSE.

We offer to the consideration of such of our readers as are intending to build a house in the country, the annexed elevation and plans, prepared by Saeltzer & Valk, architects, of this city.

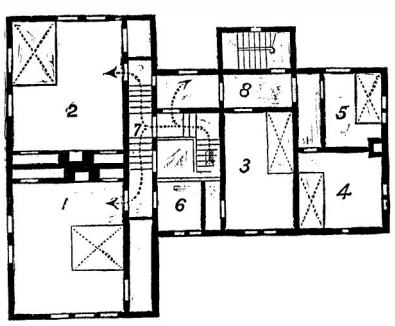
In Plan 1, A is the entrance, B the vestibule, L a hall, C the parlor, D the dining room, E the kitchen, F the pantry, G the store room, P a rear hall, M the rear entrance, O the back stairs, H a bedroom (this wing is only one story high), I a dress room, K a closet, R the verandah, S a bay window. On the second floor are five bedrooms, with closets, &c., as shown in Plan 2. The cost of a house on this plan, plainly finished, will be from $4,000 to $4,500.



FRONT ELEVATION OF A COUNTRY VILLA.

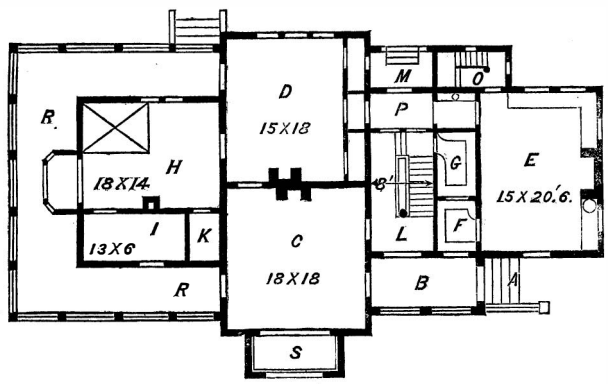
The rapid development of a taste for fine arts in this country is seen in no department more strikingly than in that of architecture. Our modern buildings, both public and private, are as superior in beauty of design as they are in costliness of material to the structures which were erected at an earlier day. It is true there is yet, on the part of our men of wealth—whether acting wholly for themselves or in the capacity of building committees—too little confidence in their own taste and too much reliance on the judgment of architects. Some man, who is a thorough master of his profession, puts up one faultless building, which gives him such a reputation that no expensive church or hall can be erected except after one of his plans. As the orders come in, to show the resources of his genius, he sends out an endless variety of the most freakish designs; and our building committees have stupidly proceeded to put them into costly stone and mortar. In this way have been produced most of the exceptions to the general elegance of our modern buildings — those deformed structures with towers on one corner and all sorts of unsymmetrical arrangements, unpleasing to the eye and offensive to the taste. We have before us two plans for Beecher's new church in Brooklyn, each of which has a tall slender spire on one corner and a short clumsy market-bell tower on the other, reminding us of Willie Wastle's wife, "A'e limpin leg a han'breadth shorter."

The very architects who, after their names are up, indulge their fancies in such sports, are careful enough, while they are making their reputations, to avoid all these violations of symmetry. Trinity Church, in this city—the most beautiful structure on the continent—is perfectly symmetrical in all its parts, and this is the




case with the new Methodist Church erected at the corner of Fourth-avenue and Twenty-second-street, the Academy of Music, the iron store of Haughwout & Co (all of which are entirely different in design), the Patent Office and other public buildings at Washington, and, indeed, with every really beautiful building that we have ever seen.

For the rapid improvement in architecture, the country is largely indebted to the late A. J. Downing. In traveling through the land we see many beautiful forms which were first fashioned in his thought; and the very general adoption of the style of the Italian villa, for country residences, shows not only the soundness of Downing's judgment in regard to what was adapted to this country, but also the instinctive correctness of the general taste when models of beauty are offered to its selection. As very few of our subscribers will be interested in plans of buildings, it is not our intention to devote a large portion of our space to them; but we may, occasionally. when we find a plan which seems to possess merit, give it a place in our columns; in this way not only giving valuable suggestions to numbers of our readers, but also contributing our share to the dessemination of that taste




for architecture which is destined to make this the most beautiful, as it is the freest and most prosperous land which the sun ever shown upon. An advertisement of the above architects will be found on another page.

## WAX—ITS USES AND COLORS.

This substance is principally derived from the cells of bees; wax being the mortar which those industrious creatures employ in the formation of their honey-combs. The wax of a bee-cell is of a yellowish brown color, and has a very pleasant odor. In its composition, it is a hydro-carbon of the same nature as tallow and spermaceti, and it has no equal for making beautiful and enduring candles, but they are too expensive for common purposes. To prepare wax for candles and ornamental moldings, such as wax figures (for which it is eminently adapted, owing to its unchanging character), it requires to be deprived of its brown color. For this purpose, the bee-cells are boiled in water several times, and strained through cloth, by which operations the impurities are removed. The finest wax is obtained from the skimmings of what are called "virgin combs." But these manipulations do not change the color of the wax. To do this, it is melted and drawn out into very thin rib-bands, and these are laid either upon the grass or upon webs of canvas, and exposed to sunlight, air and moisture, in the very same manner that linen used to be bleached by the old process. It takes several months to bleach wax by this system, but it is the best that is known, and it may be practiced by any person with a small quantity.

On a large scale, in manufactories, wax is first steamed in close vessels, then run out into thin strips from the bottom of a perforated pan, upon webs of canvas, and these are carried out to the "bleaching greens,'" and exposed to the sunlight and air until bleached. The wax is sprinkled, from time to time, with soft water, to aid in bleaching, in exactly the same manner as ivory is bleached. It might be supposed that chlorine gas, which has revolutionized the method of bleaching cotton and straw, would be applicable to wax, and that it would bleach it in as man-hours as it takes months by the old process. This agent has been experimented with, but it injures the quality of the wax while bleaching.

The chlorine is liable to unite with the hydrogen of the wax, and form hydro-chloric acid, thereby changing its composition and injuring its illuminating qualities. By submitting it to long exposure to high pressure steam, when in thin films, wax becomes nearly white; also, by boiling it in water, with about 25 per cent of sulphuric acid and the nitrate of soda. The wax must be thoroughly washed after being treated with acid in any manner. Some short and safe method of bleaching wax is a discovery much wanted. At present, the old method is the most generally practiced, because it is the only safe one. Wax tapers are not much employed in our country, but in France and some other European nations the manufacture of wax candles for religious ceremonies forms an immense business.

White wax may be colored blue with ultra-marine, reduced to an impalpable powder and thoroughly incorporated with it when melted. Verdigris, employed in the same manner, will color it green; carmine, a red; and chromate of lead, a bright yellow. Any of the common pigments will color wax. Steel and copper-plate engravers employ common beeswax, mixed with Burgundy pitch, to cover their plates preparatory to etching them. Wax is very preservative in its nature, and it was much used by the old painters for mixing with their colors before the art of oil painting was discovered. It rendered their colors very durable, and it may now be employed with great advantage by all artists in colors. To descend to a more humble use, beeswax forms an excellent preservative of leather, when mixed with tallow or neats-foot oil. About one ounce to the pound of tallow, and the same amount to each pint of oil, is a great improvement to keep leather belting, boots and shoes in a soft, pliable and water-repelling condition.

A SNAKE HAMMERED.—A huge boa-constrictor, recently from Africa, measuring full 30 feet in length and 20 inches in circumference, was lately exhibited at the Horticultural Hall, Boston, and its keeper, Mr. Bishop, came very near being hugged to death in its complicated folds. While endeavoring to remove some obstructions from its throat it commenced to coil its enormous length about his body, in order to crush him to death. The other attendants, in the first moments of alarm, retreated, but recalled by the cries for help of the imprisoned keeper they armed themselves with clubs and commenced to belabor the snake in order to induce him to release his hold. No impression was made, however, and one coil was already around the body of the unfortunate man, when a brother of Mr. Goodwin, the owner of the snake, came to the rescue with a large hammer. With this he struck the snake two violent blows upon the head which, together with a violent choking about the throat, induced the reptile to unloose its coil, when Mr. Bishop was at once set free from his horrible imprisonment

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## TESTING OF WROUGHT IRON GIRDERS.

The following is a reliable account of the testing of the iron girders of the Peabody Institute, Baltimore, Md. The girders were designed by Benjamin Severson, and made by Hayward, Bartlett & Co., of Baltimore.

The length of these girders is 69 feet; clear span, 66 feet, vertical hight or depth, 45 inches; weight of one girder, 19,738 lbs. Four of these are used to sustain a floor 66 by 100 feet. These girders being of extraordinary length—their span being probably the greatest ever made within the same depth of flooring—it was deemed prudent to subject their strength to a thorough test, to be conducted under the direction of J. C. Neilson, architect and engineer in charge of the investigation.

After the four girders were placed in position, with flooring attached to the extent of about 16,000 lbs. to each girder, besides their own weight, one of them was loaded with bricks, as follows:—The girder being of arch form, the end parts were brought up to a level with the middle or highest part, by means of 3,000 bricks. On this foundation was then built a dry brick wall, 11 bricks wide and 97 bricks in length, measuring in width 3 feet 10½ inches, and 66 feet in length. This wall was carried up uniformly to the hight of 17 courses of bricks. It was found that this load caused a depression of 1⅝ inches at the middle of the girder. This load was left upon it two weeks, when another level was taken, and it was found that the deflection had not increased.

The load was then increased by the addition of eight more full courses, and 325 bricks scattered loosely over the top of the wall. This caused a further deflection of ⅜ of an inch, making the total deflection precisely 2½ inches The load was now 30,000 bricks, equal to about 1,326 cubic feet. The bricks weighed from 4½ lbs. to 5 lbs. 6 ounces each; but, averaging them at 5 lbs., the applied load was 150,000 lbs. (the 16,000 lbs. of flooring due to a girder, and its own weight, not being included). This weight was left upon the girder several days, but the deflection did not increase. The load was then gradually removed as fast as the bricks were required for use. Then another level was taken, and it was found that the girder had resumed its original form—there was no "set" in the deflection.

The deflection under all these tests was at the rate of ⅛ of an inch to every 7,500 lbs. of load. The variable load of this floor may produce a deflection of about ½ an inch—not over ⅝ of an inch. This, in a width of 66 feet span, will hardly be perceived. Considering the great length of these girders, especially in proportion to their depth, it being more than 18 to 1, and that deflection is always proportioned to length and depth, it will be conceded, it is believed, that these girders are more rigid than any others that have been reported. And a careful comparison of the weight of these girders and the results of these tests, with the weights and capacities of other girders of various lengths and depths, will show (taking deflection for a guide) that those in the Peabody Institute are also greatly superior in strength.

## EXTENSIVE EXPERIMENTS TO TEST THE STRENGTH OF IRON AND STEEL.

Messrs. Napier & Sons, the great ship-builders of Glasgow, have recently made the most extensive series of experiments ever attempted for ascertaining the tensile strength of steel and iron. As these were made simply for their own guidance in purchasing material, they have the most absolute warrant for perfect fairness, and this circumstance, combined with the care and thoroughness with which they were conducted, renders the results entirely reliable. The London *Artizan*, for January, contains a detailed account of these experiments in five elaborate tables, covering twelve pages of that journal, and embracing a mass of minute and accurate informa- in regard to the strength of different varieties of steel and iron in bars and plates, which is a valuable contribution to the knowledge of the world. From this great mass of information we select such portions as we suppose will interest our readers. The mode of testing was simply to fasten the lower end of the bar securely. attach the upper end to the hook of an enormous steel-yard, and load the end of the steel-yard until the bar broke. Various sized bars and plates were tried. which, however, were carefully measured and from the weight required to break them, the strength of a bar or plate of similar material, an inch square, was obtained by calculation. The *Artizan* publishes these details in all the 625 experiments, but for plainness we shall give only the more important results in the leading varieties tried:—

| Variety tested. | Breaking weight in lbs. per square inch of original area. |
|---|---|
| **STEEL BARS.** | |
| T. Turton & Sons, cast steel for tools | 145,383 to 112,249 |
| Thomas Jewitt, cast steel for tools | 148,294 to 117,719 |
| Thomas Jewitt, cast steel for taps | 110,697 to 84,036 |
| Thomas Jewitt. double shear steel | 125,321 to 106,747 |
| Thomas Jewitt, spring steel | 82,719 to 65,158 |
| Shortridge, Howell & Co., homogeneous metal | 99,570 to 82,218 |
| Mersey Co., puddled steel | 75,304 to 67,065 |
| Blochairn, puddled steel | 75,114 to 45,9 31 |
| **STEEL PLATES.** | |
| T. Turton & Sons, lengthwise the plate | 95,360 to 92,858 |
| T. Turton & Sons, across the plate | 99,952 to 92,788 |
| Shortridge, Howell & Co., homogeneous metal, lengthwise the plate | 108,900 to 85,650 |
| Shortridge, Howell & Co., homogeneous metal, across the plate | 105,732 to 84,211 |
| Mersey Co., puddled steel, lengthwise the plate | 108,906 to 92,676 |
| Mersey Co., puddled steel, across the plate | 99,468 to 63,098 |
| Blochairn, puddled steel, lengthwise the plate | 106,394 to 93,327 |
| Blochairn, puddled steel, across the plate | 89,447 to 81,047 |
| Blochairn, boiler plates, lengthwise the plate | 97,413 to 95,227 |
| Blochairn, boiler plates, across the plate | 75,606 to 71,792 |
| **IRON BARS.** | |
| Lowmoor | 67,876 to 64,871 |
| Prince Demidoff, tilted bars | 55,190 to 44,600 |
| **IRON PLATES.** | |
| Lowmoor, lengthwise the plate | 57,881 to 47,426 |
| Lowmoor, across the plate | 55,368 to 47,426 |
| Farnley, lengthwise the plate | 62,544 to 56,172 |
| Farnley, across the plate | 56,546 to 52,955 |
| Mossend, best, lengthwise the plate | 43,992 to 43,012 |
| Mossend, best, across the plate | 43,875 to 38,007 |

Thus it seems that 74 tuns may be suspended by a rod of the very best cast steel, an inch square, while a rod of the same size of the poorest quality of steel will support only about 23 tuns. Steel in bars is considerably stronger than in plates, and it is almost as tenacious across the plate as lengthwise.

## THE BANKS OF THE UNITED STATES.

We are indebted to David M. Balfour, Esq., of Boston, for a valuable table of statistics, expressing the financial condition of all the banks of the United States on January 1, 1860, or a period just prior thereto. A condensation of the above elaborate compilation exhibits the fact that there are now 1,509 banks and branches in this country; and a tabular statement of the various pecuniary positions of these institutions presents, in the aggregate, the following figures:—

| | | | |
|---|---|---|---|
| Capital | $408,051,244 | Notes, bills of exchange, &c. | $755,233,223 |
| Circulation | 151,976,516 | Specie | 88,977,096 |
| Deposits | 264,437,068 | Real estate | 27,304,812 |
| Profits on hand | 47,050,303 | | |
| | $871,515,131 | | $871,515,131 |

The above table shows that the bank-note circulation of the United States, at the present time, is about $152,000,000, which is divided among bills of various denominations, as follows:—Ones, $8,000,000; Twos, $5,000,000; Threes, $4,000,000; Fives, $16,000,000; Tens, $6,000,000; Twenties, $16,000,000, Fifties, $15,000,000; Hundreds, $10,000,000; Five-hundreds, $37,000,000 Thousands, $32,000,000; and Five-thousands, $3,000,000.

We will add that the city banks of New York, Boston, Providence, Philadelphia, Pittsburg, New Orleans and St. Louis publish weekly returns of their affairs; and most of the others publish either monthly or quarterly ones.—*New York Journal of Commerce.*

A COLD ATMOSPHERIC WAVE.—During the past year, the Smithsonian Institute, under the able supervision of Professor Joseph Henry, has maintained its extended system of meteorological observation, and been enabled to make some very curious investigations respecting the three memoriable cold days of January, 1859. It was found that the cold of the three days above mentioned swept progressively over the whole country like a wave, coming down from the Arctic regions and first entering the territory of the United States at the extreme northwest, among the Rocky Mountains. It was experienced at Utah some three days before it reached the banks of the northern Mississippi, and was heralded by telegraph at Minnesota some two days before it reached Washington. At Buffalo it was some hours in advance of Boston, and was felt last on the Atlantic Ocean, where it appears to have disappeared This cold wave also swept South in a most remarkable manner, and progressively appeared in Florida and other southern States and Mexico; and the last pulsations, as it died away in that direction, were experienced in Central America and the West India Islands. Taken in all, it was one of the most remarkable phenomena ever noticed, and the facts collected seem to prove that the originating impulse came from the extreme northwestern portion of the American continent.

## RAILROAD ITEMS.

*Brakes.*—In the published testimony of the witnesses, in the case of the accident on the Hudson River Railway (reviewed by us in our issue dated Feb. 4th), the evidence of the engineers of the two locomotives are very contradictory, regarding the efficiency of the "Creamer Patent Brakes." H. G. Miliken, engineer of the train that was run into, stated that a train of five cars running at the rate of 30 miles per hour might be stopped in a distance of 40 rods (660 feet). On the other hand, Henry Jeron, the engineer of the Sing Sing train, which consisted of only one passenger car and one baggage car, going at a speed of 25 miles per hour, stated that this train could not be brought to a dead stand in a distance of less than 1,200 feet. Which is right?

*Magnetic Locomotive Wheels.*—On page 153, Vol. I. (new series), SCIENTIFIC AMERICAN, we described the experiments which had been made last summer by Mr. E. W. Serrell, C. E., with electro-magnetism, to increase the adhesion of wheels on railroads. Some experiments of the same character have recently been made on the New Jersey Central Railroad, and it is stated "with decided success." A locomotive of 21 tuns weight is said to have done as much work in heavy pulling, with electro-magnets applied to the wheels, as an engine of 36 tuns weight without them.

*Nearly a Fearful Accident.*—On the railroad between Philadelphia and Baltimore, there is a large iron ferry steamboat, 400 feet long, for crossing the Susquehannah river at Havre de Grace, and the apron to the boat is so adjusted as to permit some cars to run on an elevated track on the boat, and be carried over without changing. On this railroad there is a sleeping car for night passengers, which is among the number run directly through to Baltimore. On the morning of the 1st inst., as the train from Philadelphia reached the Susquehannah river, the express, mail and sleeping car passed as usual on to the ferry boat, but from too much headway the express car was carried over into deep water. The mail car came near going over with it, but the brakeman promptly disconnected the coupling, and thus saved further disaster. The passengers in the sleeping car were thus happily saved, and knew nothing about their danger until some minutes after the occurrenc. Had not the brakeman (a smart fellow was he!) promptly disconnected the sleeping car, every person in it, we believe, would have been drowned, as there is no way of getting out of the windows. About 56 persons generally sleep in one of these cars. It appears somewhat stupid that such a boat was not provided with a very strong chain or other means to prevent such a contingency.

*Lake Superior Iron Wheels.*—The Detroit (Mich.) *Advertiser*, in referring to a set of car wheels made at Marquette, entirely of Lake Superior iron, says:—"Two thousand of these wheels have been in use for the past two years by the Iron Mountain Railroad Company, in Marquette county, and, when put in the same trucks with Eastern wheels, *have invariably worn the latter out.* The claim that Lake Superior iron is the best in the world is no idle boast. The managers of the Grand Trunk Railway (Canada) are about introducing these wheels on their road.

*Double Tracks.*—The Western Railroad (Mass.) during the last year completed about twelve miles of second track, making 54 miles of double track between Springfield and Albany. It is proposed to complete the second track between Springfield and Worcester the ensuing season by the construction of about 10½ miles between Palmer and Warren.

*A New Line.*—The new railroad running directly west from Logansport, Ind., to Peoria, Ill., is in full operation.

THE AGRICULTURAL DEPARTMENT OF THE PATENT OFFICE.—The Commissioner of Patents having some time since formally requested that the Patent Office might be relieved of the important and increasing duties in relation to agriculture confided to it by the annual appropriations of Congress for several years past, and which the Commisioner regards as incompatible with the varied and sufficiently onerous and responsible legitimate duties of his position, the Secretary of the Interior has responded by assenting to the request preferred; and the affairs of the Agricultural Division of the Patent Office are to be arranged for transfer as early as practicable. We are also informed that the Secretary of the Interior has appointed Hon. Thomas G. Clemson the future Superintendent of the Agricultural Division.

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## WELLS' ANNUAL OF SCIENTIFIC DISCOVERY FOR 1860.

The editor and compiler of this "Annual" has, with his usual enterprise, already issued his record of science, art, inventions and discoveries for 1860, in a neat volume of 460 pages. This work was commenced in 1850, and has made it sappearance during the month of January, each year, until the present time; and we hope the author will be encouraged to continue his work for many years to come.

In looking through the pages of this year's "Annual" we feel almost tempted to transfer them bodily to our columns, with the exception of that considerable portion which is extracted from the SCIENTIFIC AMERICAN. We cannot give a correct idea of the comprehensive character of the work in any better way than by copying the title-page, which reads thus: "Annual of Scientific Discovery, or Year Book of Facts in Science and Art for 1860; exhibiting the most important discoveries and improvements in mechanics, useful arts, natural philosophy, chemistry, astronomy, geology, zoology, botany, mineralogy, meteorology, geography, antiquities, &c. Edited by David A. Wells, A. M., author of 'Principles of Natural Philosophy,' 'Principles of Chemistry,' 'Science of Common Things,' &c. Gould & Lincoln, 59 Washington-street, Boston; Sheldon & Co., New York; George S. Blanchard, Cincinnati; Trubner & Co., London." The accounts of the discoveries during the year, in these several departments, are systematically arranged, with preliminary notes by the editor on the year's progress in science and art. As specimens of the interesting character of the work we select a few extracts taken almost at random:—

### THE GRADUAL DIMINUTION OF RAINFALL IN ENGLAND AND SCOTLAND.

The Scottish Meteorological Society offer a reward of £20 ($100) for the best essay on the following questions: 1. Whether the amount of rainfall in the western parts of Europe, and particularly in Scotland, is less now than it formerly was. 2. Assuming this fact to be established, what are the most probable causes of it? With reference to the first of these questions, the secretary of the society, A. Keith Johnson, says: "Notice may be taken of the popular belief that springs of water have been gradually diminishing, or altogether drying up, especially in arable districts; and the following statement in the report of the Registrar-general for England, for the quarter ending June, 1859:—'The deficiency in the fall of rain from beginning of the year is 1¾ inch. The deficiency in the years 1854, 1855, 1856, 1857, 1858, amounting to the average fall of one year, viz., 25 inches. From a careful examination of the fall of rain (year by year), from the year 1815, it would seem that the annual fall is becoming smaller, and that there is but little probability that the large deficiency will be made up by excess in future years.' With reference to the second question, notice may be taken of the supposed effects of deep drainage and deep culture of the soil, in raising the temperature both of soil and atmosphere, in lessening evaporation, and in diminishing the condensation of vapor"

[If this process should continue, Great Britain will be reduced to barrenness.—EDS.

### IRON MANUFACTURE OF THE UNITED STATES.

Mr. Whitney, in his "Metallic Wealth of the United States," estimates the iron product of the world at 5,817,000 tuns, of which 1,000,000 are set down for the United States; Great Britain producing that year 3,000,000. When we remember that, so late as 1845, the total product of the United States in iron had not reached half a million tuns (486,000), and that in 1850 it was only 600,000 tuns, it will be seen that the progress in this important industry, in the first six years of this decade, has been at the rate of over 20 per cent per annum. The operation of this law of increase will soon, it would seem, put an end to all importation of iron, and points even to an export of this great staple at no distant day. The stock and variety of iron ores and coal in the United States are such as seem adequate to meet the demands of the world, as fast as the laws of commerce will permit their development.

### BRONZE OF ALUMINUM.

We have applied the aluminum bronze to two uses for which its qualities of hardness and tenacity appear usefully applicable, and success has answered our attempt. The first is the manufacture, in this bronze, of axle bearings, and rubbing surfaces for machines. We give as examples: First, an axle-box which was placed on a polishing lathe, making 2,200 turns per minute; it lasted for nearly eighteen months; other boxes in the same condition do not last over three months. Second, a carriage for a circular saw, making 240 turns per minute, which has lasted a year without any apparent trace of wear: the carriages in common bronze do not last more than four months. The second application is the employment of this bronze in the manufacture of guns of all kinds. We made a pistol barrel, which, after having been tried at Paris, was afterwards at the exhibition at Dijon. It underwent the tests in presence of the jury, and answered perfectly our expectations. We are aware that these experiments cannot be conclusive as to its application for artillery; but the comparative experiments which have been made with this metal, bronze, iron and steel, have shown its immense superiority over those different metals. The bars may be worked hot, as easily as the best quality of steel.—*Academy of Sciences of Paris.* The bronze here spoken of is formed of 90 or 95 parts of copper, and 10 or 15 parts of aluminum.

### PINE AS AN ORNAMENTAL WOOD.

In the royal palace at Potsdam there is a suite of apartments, the whole woodwork of which, as well as the standing furniture, consists of yellow deal, not painted, but polished, and exhibiting the natural color and grain of the wood. In England some progress has been made towards the introduction of this system in lieu of the coarse imitative efforts of the painter and grainer. London furniture dealers manufacture bedroom furniture in yellow pine, French polished, for which they find a ready sale; the preference it receives being due to its beauty only, and not its cheapness; for the necessity of using in it only the choicest timber, free from knots and blemishes of all kinds, makes the price nearly as high as that of mahogany.

### ELECTRICAL ACTION IN EGGS.

The structure of the eggs of birds offers a certain resemblance to some forms of the galvanic battery, inasmuch as it consists of a fluid inclosed in a porous diaphragm, and in contact with another fluid of a different chemical composition. This circumstance attracting the notice of Dr. John Davy, he made it the subject of experiment, in order to ascertain whether any galvanic action was exerted by the different constituents of which the egg is composed. The result fully answered his expectations; and there can be but little doubt that electro-chemical action plays an important part in the changes which the egg undergoes during the process of incubation. Using a delicate galvanometer and a suitable apparatus, on plunging one wire into the white, and the other, insulated except at the point of contact, into the yelk, the needle was deflected to the extent of 5°; and on changing the wires, the course of the needle was reversed. When the white and yelk were taken out of the shell, and the yelk immersed in the white, the effects, on trial, were found to be similar, but not so when the two were well mixed; then no distinct effect was perceptible. Indications also of chemical action were obtained, on substituting for the galvanometer a mixture consisting of water, a little gelatinous starch, and a small quantity of iodide of potassium, especially when rendered very sensitive of change by the addition of a few drops of muriatic acid. In the instance of newly-laid eggs, the iodine liberated appeared at the pole connected with the white; on the contrary, in that of eggs which had been kept for some time, it appeared at the pole connected with the yelk, answering in both to the copper in a single voltaic combination formed of copper and zinc.

### CURIOUS OPTICAL PHENOMENON.

At the Aberdeen meeting of the British Association, Sir David Brewster exhibited a curious specimen of chalcedony, in the interior of which was a landscape minutely depicted. The landscape was evidently produced by the action of nitrate of silver, which had been insinuated through pores into the interior of the chalcedony. The most curious fact, however, about the specimen was, that the landscape entirely disappeared after being kept for some time in the dark, but was restored again in a most distinct manner, after an hour's exposure to the light. Acting upon the suggestion afforded by this specimen, he had induced a lapidary in Edinburgh to try the experiment of introducing a figure into the interior of a mass of chalcedony, by drawing it on a polished surface of the stone with nitrate of silver. The attempt was wholly successful, and the figure of a dog could be distinctly seen in the center of the specimen.

[The price of this inestimable volume is only $1.25.]

## MAGNETIZED WHEELS OF LOCOMOTIVES—A TIMELY HINT TO INVENTORS.

MESSRS. EDITORS:—When I notice the experiments that have been tried to make the driving wheels of a locomotive adhere to the rails by the application of magnetism to the wheels, I wonder why I did not put forth a suggestion noted down in my private journal, under date of March 21, 1848. But I have now to regret, like many other inventors, the folly of procrastination. The entry in my journal reads thus:—"Would a magnetized wheel rolling on a soft iron bar not slip, yet roll with ease; the driving wheels of a locomotive, for instance, being so covered with coils of wire that a portion or the whole of the circumference of it will be magnetized?" I send you this to show that this invention was thought of some time prior to the claims of the present inventor, and for the forcible warning it gives to every inventor to secure, by Letters Patent, every good improvement as soon as it is made.

L. A. B.

South Edmeston, N. Y., Jan. 31, 1860.

## AGRICULTURAL LECTURES AT NEW HAVEN.

Professor Porter, of Yale College, New Haven, has instituted a series of lectures on agricultural subjects. An average of three lectures per day will be given from Feb. 1st to Feb. 25th, inclusive, making sixty-six lectures in all. For the accommodation of persons desiring to spend Sunday at home, there will be no lecture on Saturday afternoon or Monday forenoon. Each lecture will be followed by questions and a discussion. This course of lectures will be made intelligible and useful to beginners in agriculture, as well as to experienced farmers. Applications for tickets have already been received from nearly half the States of the Union. Tickets for the whole course, $10.

The following is the programme:—Agricultural chemistry, Professor S. W. Johnson; Entomology, Dr. Asa Fitch; Vegetable physiology, Prof. Daniel C. Eaton; Meteorology, Prof. B. Silliman, Jun.; Pear culture, Hon. Marshal P. Wilder; Grapes, Dr. C. W. Grant; Berries, R. G. Pardee, Esq.; Fruit trees, P. Barry, Esq.; Fruits, Lewis F. Allen, Esq.; Arboriculture, George B. Emerson, Esq.; Drainage, Hon. Henry F. French; Grasses, John Stanton Gould, Esq.; Cereals, Joseph Harris, Esq.; Root crops, T. S. Gold, Esq.; Tobacco and hops, Prof. Wm. H. Brewer; Sandy soils, Levi Bartlett, Esq.; English agriculture, Luther H. Tucker, Esq.; German agriculture, Dr. Evan Pugh; Agricultural statistics and education, Prof. John A. Porter; Cattle, Cassius M. Clay, Esq.; Stock breeding in the United States, Lewis F. Allen, Esq.; The dairy, Chas. L. Flint, Esq.; Horses, Sanford Howard, Esq.; Breaking and training horses, Dr. D. F. Gulliver; Sheep, T. S. Gold, Esq.; Pisciculture, John C. Comstock, Esq.; Agricultural associations, Mason C. Weld, Esq.; Rural economy, Donald G. Mitchell, Esq.

As a specimen of the details of the subjects, we give those of Dr. Fitch's lectures on entomology:—

LECTURE 1. Great losses sustained from depredating insects; their classification, structure, metamorphoses, habits and means of destruction. LEC. 2. Insects injurious to grain crops, with a particular account of the wheat midge and Hessian fly. LEC. 3. Insects injurious to fruit trees, with a particular account of the curculio and the apple-tree borer.

Very unexpectedly, our satisfaction with the movement of Professor Porter receives no drawback from the mode in which it is being carried out. We have learned to receive with great distrust the statements of professors in regard to agricultural science—especially in regard to agricultural chemistry. We believe quite as much falsehood as truth has been taught under this name. A closet bookworm receives a specimen of soil to analyze, and finding in it a large per cent of potash, writes to the owner of the land that wood ashes will be of no value as manure to him; and perhaps the farmer has already ascertained by repeated experiment that ashes furnish the most valuable of all dressings for this very land. Though all intelligent chemists are aware that plants as well as animals will select and assimilate the elements of which they are composed when these elements are in a certain state, and will not assimilate them when they are in a different state, they seem to forget this controlling fact in giving practical advice to farmers. They substantially ignore the essential truth that the force of vegetable life not only overcomes that of chemical affinity, but that it is itself governed by influences which are now wrapped in absolute mystery. We regard many of Liebig's directions as being just as rational as it would be for this learned chemist, having ascertained that carbon is one of the elements of the human body, to make a breakfast upon plumbago. Levi Bartlett, who is one of the ablest lecturers in this series, at one time traversed New England lecturing upon agricultural chemistry, with his boxes of lime, &c., in his desk, demonstrating, as he thought, to the farmers the truths of his science. A more thorough study of vegetable physiology satisfied him that he was mistaken, and, with a rare honesty, he came out publicly and stated that what he had been teaching was all wrong.

Entertaining these views, not of what is strictly the *science* of agricultural chemistry, but of a great deal of what is boldly but falsely taught under that name, we are pleased to see this subject occupy no larger share than it does in this series of lectures. Dr. Fitch's lecture on insects, judging from the report which we have read, must have been exceedingly interesting and full of valuable information. And we have no doubt that the whole

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course will be not only instructive in itself, but will be the means of giving a great impulse to the dissemination of really reliable information in the various departments of agriculture, which is, in every nation, the largest and most important of all interests. We hope to see other places following the example of the "City of Elms," and we hope to see not only Yale, but all our colleges turning a portion of their attention from the languages of nations who have long since passed away, and directing it more to those truths of science with which the living men of our own day and generation are brought into contact.

## LINEN AND FLAX.

MESSRS. EDITORS:—Several years ago I invented various machines and processes by which linens can be made as cheap as cotton goods, at the average cost of cotton, by the use of the unrotted flax, thousands of tuns of which are thrown away as worthless throughout this country, it being grown only for the seed. I have four patents, but other valuable inventions are not patented, and have been used only for tests in a private way. A full and satisfactory demonstration was made a few years ago, in your State, by a company which was broken up by the exposure of an attempted wrong (the details of which it is not necessary now to give) when the patents reverted to me. Since that time all my efforts to secure capital to bring out my inventions on a large scale have been unavailing; and knowing their great value to the world, I design to surrender them to the public. With this view I have in course of preparation a work on the manufactures of hemp and flax, in which the various machines and processes which have been found successful will be described and illustrated with sufficient clearness to enable all machinists and manufacturers to build and use them.

I also propose to lecture on the "Commercial Causes affecting Social Institutions" throughout the country, wherever my services may be required; proving (as I *can* prove to all persons of candor and intelligence) that linens can be made as cheap as cotton goods. My greatest regret in connection with this matter is that it is out of my power to lecture gratuitiously.

O. S. LEAVITT.

Richmond, Ind., Feb. 11, 1860.

[If our correspondent has some plan of making money by surrendering his patents, we have no desire to interfere with his business, but if he is going to take this step from motives of public spirit and generosity, we beg respectfully to offer him a suggestion. The introduction of this new manufacture is attended with a large expense and a measure of uncertainty. He can consequently expect capitalists to risk their money in it only from the hope of great profits. With a monopoly of the manufacture for even the few years covered by a patent, the prospect of a profit that would compensate for the risk of commencing the new business would certainly be much better than if the whole thing were freely open to competition the moment it was demonstrated to be profitable If Mr. Leavitt is anxious to hasten the introduction of the manufacture of flax, would it not be manifestly better for him to retain the control of his inventions? How perfectly this actual case demonstrates the tendency of the patent laws to hasten the introduction and development of new forms of industry!—EDS.

## ELASTIC HOSE FOR STEAM.

MESSRS. EDITORS.—Having noticed an inquiry made through the SCIENTIFIC AMERICAN, relating to steam being carried through elastic belting, I would state that it is so used now at the United States Naval Academy in this place. About 730 feet of it are laid between the sloop-of-war *Plymouth*, and the shore. There is a flat between this vessel and the shore; in this they have driven down piles, and both gas pipes and steam pipes are laid on them in a box. To allow for the lurching of the ship, the ends of these pipes are connected with the elastic tubing and conveyed to the vessel. It has been in use since the early part of last Fall. I was on board the *Plymouth* one day and applied a thermometer to the elastic steam tube, when a temperature of only 90° was indicated; I then applied it to the steam pipe on the other side of the ship, where there are coils of iron pipes, when it rose to 140°, thus showing that such pipes are very good non-conductors of heat, while they are very excellent for conducting steam.

The steam and gas are employed in the *Plymouth* to heat and light the midshipmen's quarters. For a long period such a means of conveying these by elastic tubing was much desired, and it was by my seeing an advertisement of it in the SCIENTIFIC AMERICAN, that this result was brought about. I told the engineers about such pipe and where it could be obtained. They have given it a trial and are much pleased with it.

T. A. MACKIBBIN.

Annapolis, Md., Feb. 9, 1860.

## COAL TAR FOR FRUIT TREES.

MESSRS. EDITORS:—About ten years ago, on the authority of A. J. Downing, I applied a thin coat of coal tar to about 50 young and thrifty apple trees, just coming into bearing. In a week or two I observed a wilted yellow appearance of the leaves; and, becoming alarmed, I adopted the most rigorous measures to save my trees; the trunks were carefully scraped to get off all I could in that way, then they were well washed with soft soap and water, half and half; next I twisted straw and wrapped it around them quite up to the limbs. The recovery was slow, but all except two or three resumed their former healthy condition during the season; those are not yet what they would have been but for the coal tar so credulously applied.

The coal tar was also applied (under the influence of the same authority) by some other parties in this village, with precisely the same results, excepting that they did not recover; the same sanitary measures not having been resorted to.

If large sound trees when removed to their new location are wrapped with straw, they will make double the growth they otherwise would do. The reason is, the roots supply the bark with that constant flow of sap that prevents the wood from seasoning, and this supply is checked the moment the roots are taken out of the ground, and is not again furnished until the roots have formed a new fiber to collect it from the soil. During the interregnum the sun and wind partially season the trunk of the tree; the sap vessels are contracted, and when again the roots send up the usual amount of sap, the sap vessels cannot take it. The straw prevents this seasoning and consequent contraction of the sap vessels.

F. W. E.

## COAL TAR AGAIN.

MESSRS. EDITORS:—I notice that one of your correspondents makes some inquiries as to the use of coal tar on fruit trees; stating that he has ruined a number by it. This was no doubt owing to the application being made without any preparation. I will give him a safe method of using it without injury, but with benefit. Give the tree first a coating of melted tallow, and apply the tar over the tallow. I speak from my own practical experience, applied in this way the tar will not injure the tree, but it will preserve it from mice and rabbits, as well as from the grub or borer, and all other insects. A ring around a plum tree will protect the fruit from the curculio. I use this article also in my garden, particularly for vines and cabbage plants, not one of which was touched the past season. The house in which I reside, has for years been infested with ants, to the great annoyance of myself and family; I thought to try the effect of the tar on them, and it exterminated them completely, they have departed from my house, orchard and garden, much to the satisfaction of—

C. F. R.

Norwalk, Conn., Feb. 4, 1860.

## CONTRACTION OF STEEL IN HARDENING.

MESSRS. EDITORS:—Having seen a statement in your paper that steel expands in hardening, I tried the experiment and find the statement correct. I had supposed that the hardening was caused by the contraction of the particles. Will some one who has a powerful microscope inform me how the particles are arranged before and after hardening? J. J.

Vevay, Ind., Jan. 28, 1860.

THE COOLNESS OF A BOILING POT.—A Virginian correspondent (T. McKernon) assures us it is a "fixed fact," often proved by experiments, that he can hold a cast iron vessel on the palm of his hand until the water ceases to boil; the vessel being quite cool while the water is boiling. He adds that he can hold a copper vessel much longer than a cast iron one; yet, strange to say, the copper bottoms burn out first. Will some of our readers express their opinions on the phenomenon?

## A COLUMN OF VARIETIES.

The earth is nearest the sun on the first of January, and the increased heat resulting from this proximity amounts to one-fifteenth of all that the earth receives from the sun. This causes countries in the southern hemisphere to be hotter in their summer than those in the northern hemisphere.....From the middle of May to the first of August, the earth receives a larger amount of the sun's heat at the north pole than falls on an equal area at the equator. This is owing to the greater length of days in the higher latitudes.....With an average annual rainfall of 31 inches, the quantity of water thrown down upon each acre of ground is nearly 3,000 tuns.... . Iron pipes, coated with coal oil, have lain for 20 years in moist earth without any commencement of rust.....A man died very suddenly in Pennsylvania from the effects of whisky. The beverage was analyzed, when the chemist reported that he found in it the poisonous constituent of cocculus indicus. The proportion found was two grains to the pint of whisky. This poison is considered fatal to human life in quantities of from five to ten grains, according to circumstances and conditions.....Cast iron may be case-hardened by being rolled at a red heat in equal parts of powdered prussiate of potash, saltpeter, and sal ammoniac, and by being then placed, whilst yet hot, in a bath containing 2 ounces of prussiate of potash and 4 ounces of sal ammoniac in every gallon of cold water.....The strength of copper is diminished one-third in rising from a temperature of 122° to 602°. Iron has been found to increase in strength up to 550°, above which point its strength diminishes.....An electro-magnet, in the cabinet of the Faculty of Sciences at Paris, supports, with 24 pairs of plates, upwards of one tun..... Huntsman of Attercliff, near Sheffield (England), was the first, in 1760, to make cast steel. He kept his process secret for ten years afterwards.....In the boilers of the *Great Eastern* there are but 17 square feet of tube surface for each square foot of grate—the proper proportion being at least 35 to 1. The chimneys for each 400 square feet of grate are but 6 feet in diameter, or less than one-half the proper size.....The cost of converting the surfaces of rails into steel, by Mr. Dodd's process, is $6 a tun. Rails thus converted have withstood the passage of 100 trains per day for three years without appreciable wear. This result has been observed at London Bridge Station.....Some of the best varieties of flint-glass are made from 54 parts sand, 22 red oxyd of lead, and 24 of carbonate of potash. Common green glass is made from 100 parts sand, 42 of sulphate of soda, and 45 of carbonate of lime.....High pressure steam is so instantaneously condensed in some of the best arrangements of surface condensers that no perceptible rise of the vacuum gage can be distinguished..... The engines of the steamship *Alma*, made by John Bourne & Co., had a stroke of piston at 3 feet 6 inches, and made 100 revolutions, equal to 700 feet of piston, per minute.....Every passenger in a French railway train, is by law entitled to a space of 18 inches in breadth, 25 inches in depth, and 4 feet 10 inches in hight.....On the Orleans Railway, of France, when the profits reach 8 per cent, 15 per cent of the surplus is reserved for the employees.....The cost of fuel burnt in the Peninsular and Oriental Company's steamships is about 10s. per mile run.....Steam brakes are in use on the locomotives of the St. German and Auteuil Railways of France.....The tide at London Bridge rises 17 feet, and at extreme high springs, 22 feet.....The Northern and Lyons Railway are the only ones in France of which no portion is laid with a single line of rails.....Tires without welds are in extensive use on the continental railroads.....Mr. Amunn arrived in London by the Bombay mail, having for sale a considerable parcel of diamonds, some of them quite extraordinary for size and importance. He had disposed of a few, the price ranging from $5,000 to £75,000. An uncut brilliant of unusual magnitude he has refused to part with for 7,000,000 francs, and stands out $1,500,000, which, if he cannot get in Paris he carries the gem to Amsterdam or St. Petersburgh. The "diggings," in Lucknow, and some other hidden localities, during the mutiny, were not unproductive.....On the Western Railway of France there is, in addition to the engine-driver and fireman, an inspector who rides upon the engine, and who attends as far as possible, to the general observance of signals or accidents made from or happening to the train.....Wampum was introduced into Massachusetts in 1658.

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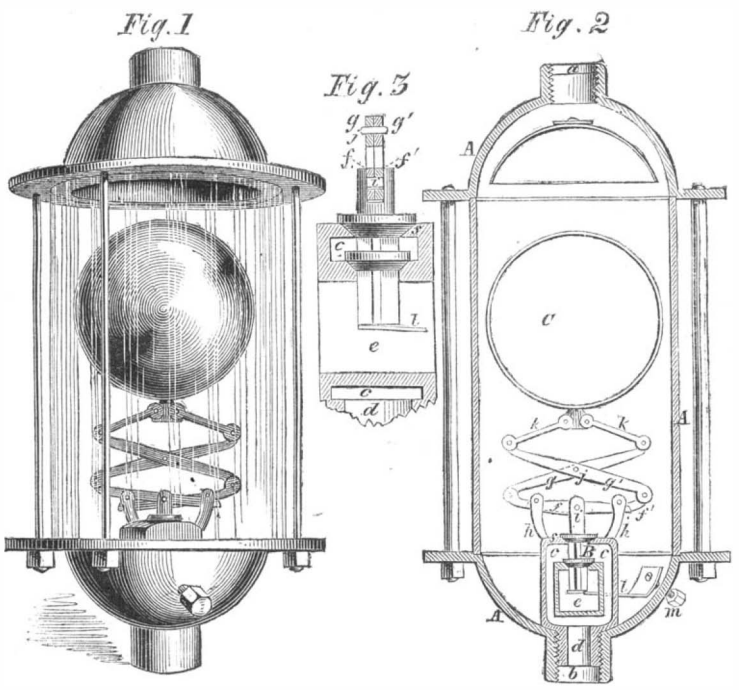
## DOUGLAS'S STEAM TRAP.

In the use of steam for heating buildings, much inconvenience is experienced by the condensing of the steam in the pipes, through which the heat is conveyed. As the hot steam flows away from the boiler through the coils of cold pipe, a portion of it is of course condensed, and if this condensation was allowed to continue without removing the water, the pipes would become filled with water, and useless for the purpose of heating. An orifice may be left constantly open for drawing off the water, but this permits the escape of the steam. For the purpose then of drawing the condensed water from the pipes without wasting the steam, a little apparatus has been invented which is called the steam trap; a great variety of them have been devised, but the latest one is represented in the annexed cut.




DOUGLAS'S IMPROVED STEAM TRAP.

The steam is admitted at *a*, and the water accumulating in the body of the trap raises the float, C, which opening the valve, B, permits the escape of the water through the pipe, *b*. As the water passes out, the float, C, falls and closes the valve, thus preventing the escape of the steam. The improvement in this trap consists in the manner in which the valve, B, is balanced. This valve is shown on a large scale in Fig. 3, in a position at right angles to that shown in Fig. 2. It is a balanced puppet valve in which the pressure of the steam is further counteracted and nicely adjusted by means of a steel spring. The chamber, *e*, communicates freely with the interior of the instrument while the chamber, *c*, is open to the discharge pipe, *d*. It will be seen that the upward pressure against the lower valve tends to counteract the pressure downward upon the upper valve, and thus permits the valve to be lifted from its seat, with a slight upward strain of the float, the lower valve being smaller than the upper. To balance this pressure more perfectly, and to adjust the balance with delicacy, a steel spring is brought against the lower end of the valve stem, the pressure of the spring being regulated by the screw, *m*, which passes through the walls of the instrument from the outside. When the apparatus is not in use, the pressure of the spring is increased by turning in the screw, *m*, to such an extent that it will lift the valves from their seats and thus permit the escape of all the water from the trap, and prevent the freezing of the working parts.

This trap is also used for feeding steam boilers which are employed merely to heat buildings, and have the steam at a low pressure; in this case the valve is inverted by the side of the boiler and placed at a level with the water in the boiler; the water in the feed pipe being sufficiently high to overcome the pressure in the boiler. A third use to which this apparatus is put, is the drawing of condensed water from the cylinders of high pressure engines.

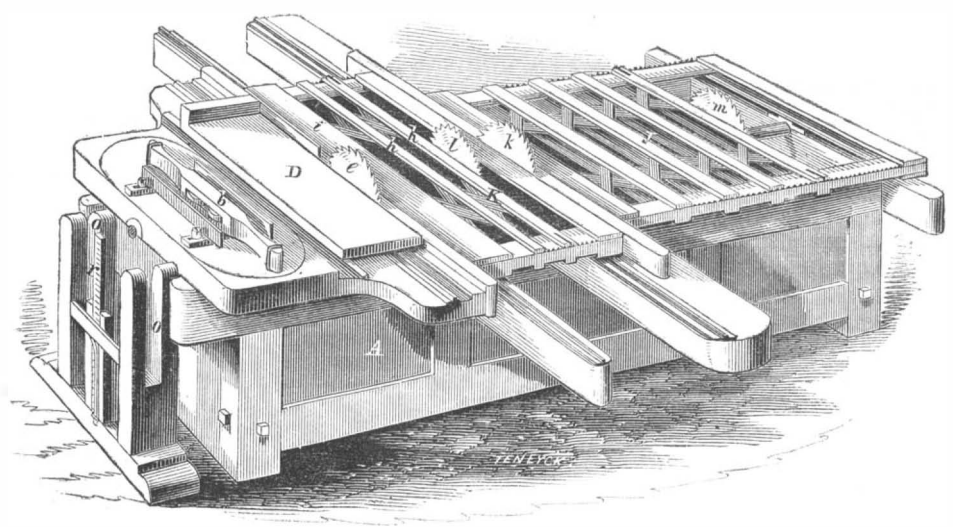
The patent for this invention was issued, through the Scientific American Patent Agency, Feb. 7, 1860, to Frank Douglas, who has sold half of it to C. B. Rogers & Co., and persons desiring further information in relato it, may address Douglas, Rogers & Co., at Norwich, Conn.

## GLASS STEAM ENGINE.

The troop of Bohemian glass-blowers are now exhibiting, at Music Hall, Brooklyn, a condensing engine made of glass. Some of the operations of steam are exhibited in this transparent model more clearly than they can be in any other way. The most surprising thing to many persons is the perfect invisibility of the steam. The bubbles are seen coming constantly from the bottoms of the boilers, giving the water the agitation of ebulition, but all the space above the water appears to be perfectly empty. But a brief inspection of the other parts shows that the power, though invisible, is in operation. The pipe that leads from the boiler to the cylinder is slightly bent downward, and in this bend is half filled with condensed water; as the valves are opened and closed, changing the direction of the flow of the steam, this water is surged back and forth with a very manifest exhibition of the force of the unseen agent.

## NEW MACHINE FOR MAKING PACKING BOXES.

The extent of the business of making boxes for packing dry goods would probably astonish any one not acquainted with the facts. Among the numerous manufacturers in this city, there is one who buys his boards by the million of feet, and the principal portion of the pine lumber which is sawed into inch boards is sold under the name of "box boards." Circular saws and other implements have long been used in this industry, but, so far as we are aware, no single compact machine for performing all the operations of cutting the boards to the proper width and length, and for jointing and matching them, has been invented previously to the one here illustrated.



PALMER'S MACHINE FOR MAKING PACKING BOXES.

The several moving parts are sustained by the solid stationary frame, A. Extending the whole length of this frame is the rapidly rotating shaft, *c*. Near the left hand end of this shaft are two cutters, such as are ordinarily used for tongueing and grooving boards, which revolve with the shaft; these are not shown in the cut, being hidden by the bar, *b*. For matching boards too narrow for use singly, they are passed on edge over these cutters between the elastic guide, *b*, and the rigid guide at its side, one of the cutters forming the tongue and the other the groove. The board is next laid upon the platform, D (which slides back and forth transversely across the frame on ways), and has its edge jointed by the circular saw, *e*. The next step is to cut the board to the proper width, for which purpose the frame, F, is made. This frame slides back and forth on ways, and has the parallel bars, *g* and *h*, connected with its side piece, *i*, by means of the lazy tongs, so that the width of the supporting platform may be varied at will without disturbing the parallelism of the bars. The circular saw, *l*, is movable on the shaft, *c*, which has a groove for keying the saw, and the saw is adjusted on the shaft to correspond with the width of the frame, F. Finally, to be cut off the proper length, the boards are laid upon the frame, J, precisely similar to the frame, F, and both ends are cut at one operation by the circular saws, *k* and *m*; the saw, *k*, being permanent in its position *a*, and the saw *m*, adjustable to correspond with the width of the frame. Both frames are provided with proper guides, and with stops to keep them from coming in contact with the saws. There are also graduated scales for adjusting the width of the platforms.

The frame shown at the left-hand end of the machine is used in putting the matched boards together. The index, *n*, is raised to indicate the desired width of the board, and pieces are then placed on edge in the spaces, *o o*, until a sufficient width is obtained.

It will be seen that, by this simple and compact machine, any number of pieces may be cut of precisely similar dimensions, and that the operation is very rapid.

The patent for this invention was issued through the Scientific American Patent Agency, Nov. 15, 1859, and persons desiring any further information in relation to it will please address the inventor, G. F. Palmer, at Farmington, N. H.

PATENT COMMITTEE—REFORM WANTED.—Speaker Pennington has appointed the following members to compose the Committee on Patents in the House of Representatives:—Hon. William Millward, of Pennsylvania, chairman; Stewart, of Maryland; Burnham, of Connecticut; Niblack, of Indiana; and Frank, of New York. Senator Bigler, of Pennsylvania, is chairman of the Senate Committee, and thus the responsibility of urging forward some reform in the patent law rests upon representatives from the great industrial State of Pennsylvania. We hope Messrs. Bigler and Millward will see to it that something is done with the proposed new patent bill. If they do no more than simply to abolish the distinction which now exists between foreign inventors and our own, in respect to fees, they will earn the approbation of inventors everywhere. It is an outrage upon all propriety that an English subject should be made to pay a $500 patent fee, while a subject of any other foreign government is made to pay only $300. Such a discrimination is unworthy of any enlightened government, and ought no longer to disgrace the statute book. Gentlemen of the committee, we respectfully inform you that our present patent laws need your attention!

THE railroad bridge connecting Galveton Island with the main land is now ready for the iron.

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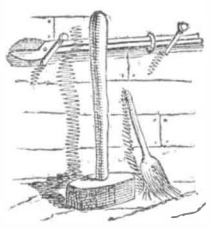
VOL. II., No. 8.....[NEW SERIES.].....*Fifteenth Year.*

NEW YORK, SATURDAY, FEBRUARY 18, 1860.


## STRENGTH OF WROUGHT IRON BEAMS.



THE public mind is deeply stirred at the present moment in regard to the proper strength of the materials employed in buildings, more especially the walls, pillars and beams, which parts, in their distinct offices, are of such vital importance to security. Three weeks ago (on page 74 of the present volume), we published a brief article on the above subject and gave the formula for calculating the strength of a wrought iron beam 17 feet long, and having a top and bottom flange 4 inches broad ½ an inch thick, with an entire depth of 9 inches. Loaded at the middle, the breaking weight was given at 21,127 lbs; and 42,254 lbs. when uniformly loaded. By Nystroms' formula, $W=16+l\lfloor k(th^2+2be^2)+xbhe\rfloor$* the strength of such a beam has been calculated at 27,811 lbs., when loaded at the middle, and 55,622 lbs., when uniformly distributed over the beam. By another formula of an intricate character, derived from the German work of an eminent professor of mathematics, the strength of the same beam has been calculated at 25,200 lbs. when loaded at the middle, and double this when uniformly distributed. In searching for formula and information from various souces, on this subject we have concluded that the simple method of calculation given on page 74 is preferable for all common purposes.

The beams for which the calculations were made have the intervening spaces filled with 4 inch brick arches, and the spandrels filled with concrete, making the distance from bottom of beams to top of concrete 13 inches; the whole being covered with flooring in the usual manner. As the hall to which these beams have reference is a drill room for soldiers, we are informed that 66 pounds per foot has been ascertained by experiment to be the weight of a crowd of persons standing on their feet; also that the weight of the archings and concrete on the beam would be about 75 pounds per foot. In the article on page 74, neither the weight of the beams nor the brick-work was given, nor was this considered necessary, because any person putting in such beams and such brick-work can, without much trouble, weigh a beam and a cubic foot of brick and mortar, and this is the best way to proceed in all such cases. We have had our attention directed to this subject, at the present time, by a very intelligent correspondent in this city; and our investigation has forced us to the conclusion that it is one regarding which, information of a reliable, simple and minute character is much wanted. Different authors whom we have consulted differ widely, and a certain vagueness prevailing in their writings lead us to conclude that they have guessed too much. We hope some of our practical men will give us their experience with wrought iron beams, and if they have not made experiments, we trust that we shall soon be able to give the results of a series, undertaken by some friend of science, for the purpose of obtaining accurate information for the benefit of all. As we believe that wrought iron beams should be more generally employed in building, we will not let the subject sleep hereafter.

We have abundant sources of information in relation to cast iron beams in the works of Professor Hodgkinson; but is it remarkable that, amid quite a number of intricate and simple formula which he gives for ascertaining their strength, the most simple appears to be as reliable as the most complex. Not long ago, a series of experiments were made in Manchester (England) with 89 beams of cast iron, to test their strength with the load placed at the middle, between the supports, when the following formula of Hodgkinson for calculating their strength was confirmed $W=2.05\ ad\div l$. In this, W is the breaking weight in tuns; 2.05, the co-efficient $a$, the vertical sectional area of lower flange in inches; $d$, the depth of beam in inches, and $l$, the length of beam between the supports in feet.

On another page of the present number there will be found an interesting article on recent experiments with girders, made at Baltimore, Md.

* "Hand-book for Mechanics," page 163.

## IGNORANCE OF STEAM—ITS DANGERS AND SAFETY.

There are periods when, from the explosions of boilers, "tumultuous horror" seems to brood over the land. This has been caused in this locality by the explosion of two boilers, within 24 hours after one another, in the city of Brooklyn, just as our last issue was sent to press. The first occurred at a distillery, and the second in a hat factory; by the former three persons were instantaneously killed, and by the latter no less than eight, and several others were severely injured. These events have greatly increased public alarm regarding the dangers of steam, and this has been in a measure promoted by the inappropriate remarks of the coroner and the erroneous decision of the jury, in the case of the distillery explosion. The coroner asserted that "a certain per-centage of boiler accidents *will* take place, notwithstanding the precautions that are taken to prevent them—that they are, in fact, the necessary result of the application of steam power to manufacturing purposes." Guided by such a marsh-light, the jury in the case rendered the erroneous decision that "the explosion was the result of the displacement of water from one boiler into another, and the consequent generation of a large quantity of hydrogen gas." The coroner should not have used the language we have quoted; it is to the effect that such explosions are necessary consequences of the applications of steam. He should have stated that explosions were the inevitable results of carelessness, recklessness or ignorance. The jury has rendered a wrong decision; hydrogen gas had nothing to do with the explosion, because it is not an explosive gas. Their decision amounts to saying the boiler exploded itself, of a necessity, and nobody was too blame. This boiler was one of a *stack*, in which several are connected together; and the jury should have directed inquiry as to how the water in it was driven into the adjoining one, thereby causing the former to become red-hot. Had the steam spaces of all these boilers been connected together as they ought to have been, such an explosion would not have taken place. The jury should have brought in a verdict that the accident was caused by a defective arrangement of the boilers.

The investigation before the coroner's jury in the case of the explosion at the hat manufactory has resulted in finding it to have been caused by the fault of the engineer in charge, who was an old experienced machinist, and was believed to be a very careful man. There were three cylindrical flue boilers, each 24 feet long, 42 inches in diameter, with two flues each. They were built for a 50-horse-power engine, by Woodruff, Beach & Co., of Hartford, Conn., and were capable of standing a pressure of more than 100 lbs. on the square inch. It has come out in evidence that there was but one pressure gage and one safety valve for the three boilers; but they were all connected by steam pipes, on which there were cocks for shutting it off. Mr. John M. Weeks, one of the United States inspectors of steamboats for this district, testified that he had examined the boiler which exploded, and found the cocks of the feed and steam pipes perfectly closed. The boiler had been fired-up; no water could get in, and no steam could get out; the inevitable sequence of this was the explosion. No one could tell what pressure of steam was in the boiler at the time, and the engineer—Mr. Eastman—who was the cause of the accident, perished through neglect of doing his duty.

Both of these explosions could have been avoided by proper arrangements. Had there been a safety valve and gage on each of the boilers at the hat manufactory, the explosion would not have occurred. Most makers and managers of boilers deal with steam as a drunkard does with ardent spirits. We assert, without the fear of successful contradiction, that steam boilers may be made to be used with as much safety as the boiling of water in tea-kettles. Under proper laws and a thorough system of inspection, explosions may be completely prevented.

## BURNINGS—FIRE-ESCAPES.

Accidents seem to come in *streaks*. During the last month they have flowed in a perfect torrent. On Sunday morning, the 29th ult., the large printing establishment of Wynkoop, Hallenbeck & Thomas, in Ann-street, this city, was burned down, and several of our cotemporaries met with great losses. The *Ledger*, *Mercury*, *Bradstreet's Commercial Reports*, the *Coachmakers' Magazine*, and *Railway Review* were more or less sufferers; the latter, we regret to state, lost the entire "form" for one of its issues. On the night of the 2d inst., at the early hour of 8 o'clock, a fire broke out in a bakery kept in the cellar of the large tenement house No. 142 Elm-street, and in a few minutes the wooden stairs leading to the upper stories were burned down, and escape in that direction completely cut off. Many persons saved their lives by jumping out of the windows, but 10 women and children were consumed in the flames. The scene was heart-rending; the longest ladders could not reach the top stories to save the shrieking beings who at last fell a prey to the devouring element. This tenement house caught fire from the bursting of a fluid lamp.

That so many lost their lives at that early hour in the evening, from the narrow stairway being burned and the inability of ladders to reach the highest stories, is criminal and disgraceful to our city. What a defective fire department we have, when there were not sufficient agencies to save the lives of all on that occasion! Fire-escapes, such as those employed in London, have been frequently recommended through our columns. One of these would have saved the life of every human being lost in that house. These "escapes" consist simply of a stout ladder about 30 feet in length, having two others of shorter length and lighter make, which slide within the larger one, so that one or both can be promptly extended, thus elongating the ladder as occasion requires. The principal ladder is fixed perpendicularly on wheels to a small cart, and is easily drawn by two men. The machines are to be found at regular stations, in every parish church-yard or elsewhere. At night they are placed outside the fence in the street, in care of the policemen, and, at every alarm of fire within their district, are wheeled to the scene of conflagration, and often render prompt and efficient aid. A large sack of strong linen is suspended above the ground and underneath and around the ladder, so that if the person in descending should fall, no serious injury ensues.

The coroner's jury in the above case has censured the proprietor of the building for erecting such a "man-trap." A few years ago, a committee of the New York Legislature examined the tenement houses of this city, and reported that most of them were dangerous and unhealthy. The narrow wooden stairs belonging to many of them were condemned as inadequate for egress in case of fire; and yet nothing has been since done to carry out the suggestions set forth in that document. It would be an easy matter, without much increase of expense, to apply fire-proof (iron) stairs to all buildings; and no tenement house should ever be erected without ample provision being made in it for such emergencies as that which has occurred in Elm-street.

## ERICSSON'S AIR ENGINE.

Having constant calls for our opinion of Ericsson's air engine, we have concluded to investigate the invention in its present arrangement, and to express our opinion so fully and distinctly that this one article will serve as a reply to all these inquiries. It is well known that the SCIENTIFIC AMERICAN had a long controversy with almost the whole press of the country, in relation to Ericsson's "caloric engine," and that the truth of our positions was verified in the most striking manner by the removal of the costly "caloric" from the ship *Ericsson*, and the substitution in its place of the ordinary steam engine. The "caloric" was an entirely different machine, acting on a different principle, from Ericsson's air engine in its present form; the former compressed the air into the heating chamber, while the latter simply opens a valve and allows it to flow in. The cylinder is open at one end and has a tight cast iron furnace set into the other; cold air is admitted through a valve in the piston and, being expanded by coming in contact

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with the heated surface, forces the piston outward. This outward stroke not only furnishes all the available power but yields an amount in addition which is sufficient, acting through the balance wheel, to force back the piston to its original place, expelling at the same time the expanded air which has done its work, and introducing a fresh supply of cold air for the succeeding stroke. This exchange of hot air for cold is effected by means of a supplementary piston, the rod of which passes through a stuffing box in the outer or working piston. When the outward stroke is completed, the force of the balance wheel is brought to act upon the rod of the inner or supply piston, giving it a motion inward much more rapid than that of the working piston, expelling the hot air through a large valve or port near the inner end of the cylinder, and sucking in the cold air through a port in the working cylinder; this cold air occupying the space between the two pistons. The balance wheel now acts upon the outer piston, pushing it inward and driving the cold air through a large valve in the supply piston into a chamber around the furnace, where it is quickly heated, and the stroke is repeated. The arrangements by which these several changes are effected can only be made intelligible by diagrams.

As we have previously stated, we are satisfied that the air engine has at last reached a stage of improvement in which it is of practical value in that sphere of operations in which a small power is required. For pumping water, for driving printing presses, for hoisting goods, for washing clothes, for cutting feed, for driving plantation mills, and for innumerable other uses in agriculture, in domestic life, and in the mechanic arts, a motor is needed less powerful than the steam engine, and it seems altogether probable that the air engine is to supply this great want. The field is not only of immeasurable but of inconceivable extent. The number of small motors wanted is many times that of great ones We would give more for a monopoly of engines under five horsepower than we would for that of all those of larger size. The mind is lost in the effort to imagine the endless variety of uses which there are for a small and cheap motor. All other departments of invention sink into insignificance when compared with that of motive power. It may be that the most remarkable feature of the decade on which we have entered will be the introduction of the air engine, as that of the sewing machine was of the last decade.

We are informed that the company engaged in the manufacture of these engines have recently supplied a double motor of this character to drive the sugar mills of an extensive Cuban plantation; it has given the best satisfaction, and new orders for the same purpose are now being executed It has also been adapted most beautifully to drive sewing machines, and there are at least one hundred such machines now operated in this city in this manner. A considerable order has also been received from a Chilian mining company. We are entirely satisfied, after a careful examination into the merits of this engine, that, for a safe, economical and convenient power for the smaller purposes of business, it is reliable.

The Caloric Engine Agency, No. 164 Duane-street, this city, under the charge of John B. Kitching, Esq., has issued a pamphlet which contains many particulars for which we have not the space, and which it is not necessary now to specify.

## THE STEAMER ADRIATIC.

This steamer was the last which was built for the once-famous "Collins' Line." Her naval architect was the late distinguished George Steers. Her model is exquisite, and no expense was spared to render it the best in the world for speed and comfort. The engines were designed and constructed at the Novelty Works, this city, and were intended to be *novelties* in their arrangement, and without rivals in economy and power. After an immense number of alterations had been made in them, she was at last so far completed as to make one voyage across the Atlantic. It was a quick passage, but made, it is said, at a most tremendous expenditure for fuel. The steam valves did not operate well, and there was an amount of leakage caused by them which was perfectly appalling. After the voyage the *Adriatic* was laid up, and she has not made a single trip since. When the Collins' liners were sold out, last year, they were purchased by one of the companies connected with the California trade; and the old steamers, *Atlantic* and *Baltic* have been running to Aspinwall in the service of the North American Steamship Company, ever since, and they have both done well, but the *Adriatic* has not yet made a voyage. Her machinery seems to be defective. She is now having an adjustable cut-off applied, capable of operating through the whole length of stroke, after which she may do something more or less creditable to her engineers. The engines of the *Adriatic* are the largest oscillators in the world, and her model is perhaps unequaled for speed by any other vessel afloat. Why then has she been so unsuccessful thus far? Simply on account of defective valve arrangements, according to both general and special reports of those who have made examinations. The valves of the engines are "puppets" and have been arranged in various ways; the voyage across the Atlantic having been made with an incomplete "Sickles' cut-off." Whether the new arrangement of valves will render this vessel a success, or not, has yet to be proved, but a very general opinion prevails that, if the engines of this steamer were just as good as those of the *Atlantic* or *Baltic*, she would be the fastest in the world.

## CARPET LOOM EXTENSION CASE—IMPORTANT DECISION.

The name of Erastus B. Bigelow has become somewhat famous among the many distinguished inventors of the country. He not only appears prominent upon the records of the Patent Office, but is known to have realized a fortune from the introduction of his inventions, which have been principally for improvements in power looms for weaving ingrain carpets. A patent was issued to Bigelow for a carpet loom in August, 1846, and, at his request, was anti-dated to Feb. 18, 1846, and the fact that he had applied for the extension of this patent was announced in the first number of our present volume. The case excited considerable interest involving, as it did on either side, interests of great value and importance. This application was principally opposed by the Hartford Carpet Company, which was organized out of the *debris* of the Thompsonville and Tariffville Carpet Works. The case came up for hearing before Commissioner Bishop on the 6th inst., and on the 8th a decision was rendered by him, denying the extension. The extension was refused upon the ground that several looms, embodying the invention patented in 1846, were sold to and used by the Lowell Manufacturing Company for more than two years prior to the application of Bigelow for the patent. The Commissioner was also of the opinion that, while the invention showed much ingenuity, labor and skill on the part of the inventor, yet, but for the improvements afterwards added to it and patented by Bigelow, it could not have proved either useful or important to the public, and that these latter improvements rendered the loom profitable and useful.

AMERICAN INSTITUTE ELECTION.—The annual election of officers of the American Institute took place on the evening of the 9th inst. It was a somewhat exciting affair, and resulted, with but few exceptions, in the choice of a new set of officers. The leading idea in this revolution in the management of the "Old Institute" is to infuse new life into its decaying organization; and we hope this may prove to be true, for it needs it much, and unless something of the kind be done before another fair is held, the Institute might just as well go into liquidation. In regard to the new Board several members are gentlemen of moral worth; but taking it as a whole, we do not see anything in this movement that promises amendment or reform, and it will be well for our manufacturers, mechanics, and inventors to be cautious not to make any promises to the new Board at present, respecting the fair next Fall. For our part we have but little confidence that the new management will do any better, if as well as the old Board.

DEATH OF JUDGE INGERSOLL.—We regret to inform our readers that the Hon. Judge Ingersoll, one of the justices of the United States Circuit Court, died at his residence in New Haven on the 9th inst., after a short but painful illness. Judge Ingersoll was an able lawyer and an upright man. His name had become somewhat prominent in connection with some important patent suits that were tried before him, and which still remain undecided. His death will not only be lamented by many personal friends, but also by many who had important interests committed to his care as a judge.

## EX-COMMISSIONER BISHOP

Ex-Commissioner Bishop passed through this city last week, on his way to his home in Connecticut, having, as our readers are aware, voluntarily resigned his office. A rumor is in circulation that he left the Patent Office in consequence of disagreement with the Secretary of the Interior. This, we are happy to learn from him, is wholly unfounded; their intercourse having at all times been mutually pleasant. Mr. Bishop, though but a short time in the Patent Office, has won for himself the confidence and esteem of all who have had business with that interesting department; and his retirement from a post for which he has shown a peculiar fitness is much to be regretted. When it was announced that Mr. Bishop had received the appointment, we stated, in advance, that his administration of the office would be "wise and prudent, and, on the whole, popular and satisfactory." This opinion has been fully sustained in the decisions which he has been called upon to make on intricate and important interference and extension cases which have come before him. In the vault cover extension case (published on page 338, Vol. I., new series, SCIENTIFIC AMERICAN), Mr. Bishop's decision is a model of clear, perspicuous reasoning; showing, at the same time, a true and just appreciation of the claims or the inventor.

Governor Thomas, the newly-appointed Commissioner, will, it is understood, enter on his duties immediately, and we do not doubt that he will prove himself a worthy successor of the late incumbent.

BREECH-LOADING CARBINES.—The Secretary of War has issued an order to Poultney & Trimble, of Baltimore, for several hundreds of Gilbert Smith's patent breech-loading carbines; they having been called for by a large number of officers of the army as the arms best adapted to the wants of the service.

[The above notice appears in the telegraphic reports (from Washington) of the associated press. We rejoice in the good fortune of our worthy clients, Messrs. Poultney & Trimble. The order is a meritorious one, as it recognizes the value of a good improvement.—EDS.

ANOTHER INVENTOR IN LUCK.——After the descriptive matter was set up to accompany the engraving of Mr. Palmer's Box-sawing Machine, which appears on another page, we received a letter from him in which is the following remark:—"I write to let you know that I am in luck, having sold the right on my box machine for Maine and New Hampshire for the sum of $4,500."

## WEEKLY SUMMARY OF INVENTIONS.

### PADDLE WHEEL.

This invention is a simple, cheap and efficient paddle wheel, having a constant propelling action, which action gradually increases as the floats or propelling wings are submerged, and diminishes as they are drawn up from the water; there will thus be very little, if any, lifting of water, and the greatest effective action of the floats will be parallel with the surface of the water, and this will only take place when the float reaches its lowest point, or when it is vertical, and the others are not acting. This wheel, on account of its peculiar form and construction, can be submerged lower than the present wheels, and a much greater superficial area be brought to react upon the water; the engine can be set lower in the boat; while the size of the wheels compared with those of the present construction will be greatly diminished, still it will have the same effective action. The object of this invention is also to combine with the aforesaid advantages, uniformity of motion, regularity, and no trembling. The invention consists in forming the paddles out of pairs of square plates of sheet metal, each plate being cut in a peculiar way and the corners bent over and riveted to the opposite plates, forming four peculiar-shaped buckets or propellers. The credit of this contrivance is due to H. B. Fay, of this city.

### CONVERTING MOTION.

This invention consists in the combination with a rotary shaft and a slotted rod or other piece arranged to slide or work rectilinearly in a plane perpendicular to the axis of the shaft, of a compound crank of peculiar construction, carried by said shaft and having its wrist fitted to the slot of the said rod or piece, and a stationary eccentric guide surrounding the axis of the shaft and receiving a guide pin on the crank, the whole operating together, so that by the rotation of the shaft a great variety of irregular reciprocating rectilinear movements of the slotted rod may be obtained. The patentee of this invention is William H. Lizelle, of this city.

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### BRAKE FOR VEHICLES.

This invention relates to an improvement in that class of brakes for wheel vehicles, in which the brake is actuated through the medium of the draught-pole without any direct or special manipulation on the part of the driver, and are consequently termed self-acting. This class of brakes, although very convenient and desirable in many respects, possess the disadvantage of precluding the backing of the vehicle to which they are applied, unless some stop or appliance be used to break or dissolve the connection between the breaks and the draught-pole. The object of this invention is to furnish such a means, one that may be actuated by the driver with the greatest facility, and without rendering the brake at all complex. This improvement was designed by W. A. Gibson, of this city.

### RAILROAD GATE.

This invention relates to an improved arrangement of means for opening and closing railroad gates through the medium of the locomotive as the latter passse along, the gates shutting off the highway sometime previous to the arrival of the locomotive thereat, so that vehicles on the highway will not be liable to be brought in collision with the locomotive, the latter also opening the gate after it and the train have passed the highway. The inventor of this improvement is Robt. W. Jenks, Jr., of Providence, R. I

### WINDOW SHUTTERS.

This invention consists in a peculiar way of connecting the slats of the shutter together and folding the same, whereby a very simple and efficient metallic shutter is obtained, one that may be readily opened and closed, and capable of being applied in all cases where the usual metallic shutters can be used. The object of this invention is to avoid the great friction and consequent labor and embarrassment attending the raising and lowering of the ordinary metallic shutters, and at the same time economize in the construction and in the application of that class of shutters to windows. J. Hodgson, of Indianapolis, Ind., is the inventor.

## FOREIGN NEWS AND MARKETS.

A very distinguished English inventor has recently "gone the way of all the earth," and under circumstances which call forth our sympathies. This man was James Boydell, the inventor of the steam traction engine for common roads, and one of the greatest mechanical worthies of the age. He died about five weeks since, of decline brought on by cold caught through exposure on the Woolwich marshes, when waiting for high officials to test his engine. He was a man of giant frame, simple and noble disposition, untiring industry and great genius. He was in the very prime of life, and had made an appointment with some of the government snobs to test his engine in the Woolwich marshes, and was kept waiting for their attendance in vain during a severely inclement day in December, by which he caught a severe cold, from the effects of which he never recovered. No man has done more to render the steam engine adaptable for drawing heavy loads on common roads than James Boydell. His inventions principally consist in applying a moving railway to the wheels, and he had been eminently successful in many cases. Several of his peculiar locomotives are in use in England, and some have been sent abroad. They are not adapted for quick traveling, but for drawing heavy loads—such as would require 10, 12, and even 20 horses—they are invaluable, and will yet come into more general use. English papers complain that James Boydell was murdered by government routine.

There seems to be a fatality resting upon the *Great Eastern* and all those who have been principally connected with her. Her projector—Brunel—departed life suddenly, when this vessel was making its first trip; an explosion on board then sent a number of persons to their "long home;" Scott Russell, her builder, has been rather disgraced as her engineer; her old directors have all resigned under public contempt; and now her commander—Captain Harrison—who is is well known in New York as an old Cunard skipper, has departed to "the narrow house appointed for all living." He was thrown into the water at Southampton, by the upsetting of a boat, and he sunk for a few seconds before he was recovered. Medical aid was at once obtained, and every effort made to restore animation; but all in vain. He was very highly respected as a popular commander, and his sudden death has caused much sincere regret.

Much attention is now being devoted in England to the improvement of surface condensers for marine engines, and there are good prospects of ultimate success. Why should not the same water be employed over and over again in steam boilers, instead of pumping up salt brine from the sea to feed the waste of pure water flowing off as condensed steam? In regard to this feature of steam navigation, most engines are in a state of barbaric incompleteness. Every engineer admits that there would be no incrustations formed in steam boilers, and no heat wasted for blowing off the saturated brine, were surface instead of interior condensers used. It is no argument against the employment of such apparatus that different kinds of them have been tried and have failed. The difficulties to their success have been mechanical, not philosophical; hence, inventors can remove all such obstructions, and we are happy to say they are doing so. In England, as in America, the surface condenser has lately been applied to some small steamships with great success. The method which has been found most suitable is to force the cooling water by a pump through tubes in the condenser, and allow the steam to flow all through the box around the water tubes. One small steamer, running between the coast of England and the island of Jersey, has had one of these condensers in her for two years, and it is perfectly sound yet.

Business is excellent throughout all the manufacturing districts, and the country enjoys an unexampled state of prosperity.

A new treaty of commerce has just been made between England and France, in which the duties on most articles of trade between the two countries have been greatly lowered. It is expected that this will result in mutual advantage to the people; that it will incite the industrial efforts of both to increase their products and exchanges. It is by encouraging increased production and fair exchanges that wealth and comfort are increased among the nations.

No less than 2,340,000,000 yards of calicoes were exported from England last year, which is an increase of several millions over any previous year. One-half of this amount was sent to China and the East Indies, and the next best customers were the United States and Brazil.

The metal markets are steady, with a slight increase for rails, especially for the East Indies, where a splendid system of railroads has been projected, and the work of their construction is going on.

## NEW YORK MARKETS.

CANDLES.—Sperm, city, 38c. a 40c. per lb.; sperm, patent, 50c.; wax, paraffine, 50c.; adamantine, city, 18c. a 21c.; stearic, 27 a 28c.

COAL.—Anthracite, $4.50 a $5; Liverpool orrel, per chaldron, $12; cannel, $13.

COPPER.—Refined ingots, 24c. per lb.; sheathing, 27c.; yellow metal, 20c.

CORDAGE.—Manilla, American made, 8¼c. per lb.; Rope, Russia hemp, 12c.

COTTON.—Ordinary, 9c. a 9¼c.; good ordinary, 9⅞c. a 10⅜c.; middling, 11⅜c. a 11⅞c.; good middling, 12c. a 12¾c.; middling fair, 12⅞c. a 13⅛c.

DOMESTIC GOODS.—Shirtings, brown, 30-inch, per yard, 6c. a 7¼c.; shirtings, bleached, 26 a 32-inch, per yard, 6c. a 8c.; shirtings, bleached, 30 a 34-inch, per yard, 7c. a 8½c.; sheetings, brown, 36 a 37-inch, per yard, 5½c. a 8¾c.; sheetings, bleached, 36-inch, per yard, 7½c. a 15c.; calicoes, 6c. a 11c.; drillings, bleached, 30-inch, per yard, 8¼c. a 10c.; cloths, all wool, $1.50 a $2.50; cloths, cotton warp, 35c. a $1.37; cassimeres, 85c. a $1.37½; satinets, 30c. a 60c.; flannels, 15c. a 30c.; Canton flannels, brown, 8½c. a 13c.

DYEWOODS.—Barwood, per tun, $18 a $20; Camwood, $130; Fustic, Cuba, $35 a $36; Fustic, Tampico, $25; Fustic, Savanilla, $20 a $22; Fustic, Maracaibo, $18.50 a $19; Logwood, Laguana, $22 a $23; Logwood, Tabasco, $21; Logwood, St. Domingo, $14.50 a $15; Logwood, Honduras, $16 a $17; Logwood, Jamaica, $13.50 a $14; Lima wood, $65 a $75; Sapan wood, $45.

FLOUR.—State, superfine brands, $5 a $5.05; State extra brands, $5.20 a $5.35; Michigan fancy bands, $2.25 a $5.30; Ohio, common brands, $5.20 a $5.30; Ohio, fancy brands, $5.35 a $5.40; Ohio, fair extra, 5.65 a $5.80; Ohio, good and choice extra brands, $5.85 a $6.75; Michigan, Indiana, Wisconsin, &c., $5.20 a $5.35; Genesee, fancy brands, $5.46 a $5.60; Genesee, extra brands, $5.65 a $7.25; Missouri, $5.40 a $7.50; Canada, $5.45 a$6.75; Rye flour, fine, $3.75 a $3.90; corn meal, $3.80 a $4.20.

HEMP.—American undressed, $120 a $150; dressed, from $160 a $200. Jute, $95 a $97. Italian, $275. Russian clean, $190 a $200 per tun. Manilla, 6½c. per lb. Sisal, 5⅝c.

INDIA-RUBBER.—Para, fine, 55c. a 60c. per lb.; East India, 52c.

INDIGO.—Bengal, $1 a $1.55 per lb.; Madras, 70c. a 95c.; Manilla 60 c. a $1.10; Guatemala, $1 a $1.25.

IRON.—Pig, Scotch, per tun, $25; bar, Swedes, ordinary sizes, $85 a $86; bar, English, common, $42.50 a $43.50; refined, $52 a $54; sheet, Russia, 1st quality, per lb., 11¾c. a 11¾c.; sheet, English, single, double and treble, 3½c. a 3⅞c"; anthracite, pig, $24 per tun.

IVORY—Per lb., $1.25 a $1.30.

LATHS.—Eastern, per M., $1.75 a $2.

LEAD.—Galena, $5.75 per 100 lbs.; German and English refined, $5.60 a $5.65; bar, sheet and pipe, 6¾c. a 7c. per lb.

LEATHER.—Oak slaughter, light, 29c. a 31c. per lb.; Oak, medium, 30c. a 32c.; Oak, heavy, 28c. a 31c.; Oak, Ohio 29c. a 30c.; Hemlock, heavy, California, 20c. a 21½c.; Hemlock, buff, 15c. a 18c.; Cordovan, 50c. a 60c.; Morocco, per dozen, $18 a $30; Patent enameled, 16c. a 17c. per foot; light Sheep, morocco finish, $7.50 a $8.50 per dozen; Calf-skins, oak, 55c. a 60c. per lb.; Hemlock, 56c. a 60c.; Belting, oak, 32c. a 34c.; Hemlock, 28c. a 31c.

LIME.—Rockland, 75c. per bbl.

LUMBER.—Timber, white pine, per M feet, $17.75; yellow pine, $35 a $36; oak, $18 a $28; Eastern pine and spruce, $14 a $15; White Pine, clear, $35 a $40; White Pine, select, $25 a $30; White Pine, box, $14 a $18; White Pine, flooring, 1¼ inch dressed, tongued and grooved, $24.50 a $25; Yellow Pine, flooring, 1¼ inch, dressed, tongued and grooved, $29 a $32; Black Walnut, good, $45; Black Walnut, 2d quality, $30; Cherry, good, $45; White Wood, chair plank, $42; White Wood, 1 inch, $23 a $25; Spruce Flooring, 1¼ inch, dressed, tongued and grooved, each, 22c. a 24c.; Spruce Boards, 15c. a 17c.; Hemlock Boards, 12½c. a 14c.; Hemlock wall strips, 10c. a 11c.; Shingles, cedar, per M. $28 a $35; Shingles, cypress, $12 a $25; Staves, W. O. pipe, light, $55 a $58; Staves, white oak, pipe, heavy, $75 a $80; Staves, white oak, pipe, culls, $30 a $35; Staves, do. hhd., heavy, $70; Staves, do. bbl. light, $30 a $35; Staves, do. bbl. culls, $20; Mahogany—St. Domingo, fine crotches, per foot, 35c. a 45c.; St. Domingo, ordinary do., 20c. a 25c.; Honduras, fine, 12½c. a 15c.; Mexican, 13c. a 15c.

NAILS.—Cut, 3½c. a 3¾c. per lb.; American clinch, 5c. a 5½c.; American horse-shoe, 14½c

OILS.—Olive, Marseilles, baskets and boxes, $3.45 a $3.50; Olive, in casks, per gallon, $1.12 a $1.25; Palm, per pound, 9c. a 9¼c.; Linseed, city made, 57c. a 58c. per gallon; linseed, English, 57c. a 58c.; whale, fair to prime, 48c. a 52c.; whale, bleached 59c. a 60c.; sperm, crude, $1.40 a $1.43; sperm, unbleached winter, $1.47; lard oil, No. 1, winter, 90c. a $1; red oil, city distilled, 57c.; Wadsworth's refined rosin, 30c. a 40c.; boiled oil for painting, 35c. a 40c.; tanner's improved and extra, 30c. a 40c.; camphene, 45c. a 47c.; fluid, 50c.

PAINTS.—Litharge, American, 7c. per lb.; lead, red, American, 7c.; lead, white, American, pure, in oil, 8c.; lead, white, American, pure, dry, 7¼c.; zinc, white, American, dry, No. 1, 5c.; zinc, white, French, dry, 7¼c.; zinc, white, French, in oil, 9¼c.; ochre, ground in oil, 4c a 6c.; Spanish brown, ground in oil, 4c.; Paris white, American, 75c. a 90c. per 100 lbs.; vermillion, Chinese, $1.12½ a $1.22; Venetian red, N. C., $1.75 a $2.25 per cwt.; chalk, $4 per tun.

PLASTER-OF-PARIS.—Blue Nova Scotia, $2.75 per tun; white, $3.50; calcined, $1.20 per bbl.

RESIN.—Turpentine, soft, N. C., per 280 lbs., $3.50 a $3.56; Wilmington, &c., $3.50 a $3.56; common, per 310 lbs., $1.55 a $1.58; strained and No. 2, $1.60 a $1.90; No. 1, per 280 lbs. $2 a $2.75; white, $3 a $4; pale, $4.50 a $5.50.

SALTPETER.—Refined, 12c. per lb.

SOAP.—Brown, per pound, 5c. a 8c.; Castile, 8¾c. a 9c.; Olive, 7c. a 7¾c.

SPELTER plates, 5c. a 5¾c. per lb.

STEEL.—English cast, 14c. a 16c. per lb.; German, 7c. a 10c.; American spring, 5c. a 5½c.; American blister, 4½c. a 5½c.

SUGAR.—New Orleans, 7c. a 8¾c. per lb.; Porto Rico, 7c. a 8¾c.; Havana, brown and yellow, 7c. a 8¾c.; Havana, white, 9c. a 9¾c.; Brazil, white, 8c. a 8¼c.; Brazil, brown, 7¼c. a 7⅝c.; Stuart's granulated, 11c.

SUMAC.—Sicily, $70 a $80 per tun.

TALLOW.—American prime, 10¼c. a 10⅜c. per lb.

TIN.—Banca, 32c.; Straits, 30c.; plates, $6.50 a $9.25½, per box.

WOOL.—American, Saxony fleece, per lb., 55c. a 60c.; American full blood merino, 48c. a 52c.; extra, pulled, 45c. a 50c.; superfine, pulled, 39c. a 43c.; California, fine, unwashed, 24c. a 32c.; California, common, unwashed, 10c. a 18c.; Mexican, unwashed, 11c. a 14c.

ZINC.—Sheets, 7c. a 7½c. per lb.

The foregoing rates indicate the state of the New York markets up to February 9th.

Markets have been very steady during the week; scarcely a change in anything but flour, which has advanced somewhat, owing to favorable advices from Europe. There has been a more active demand both for export and speculation, and an advance of five cents per barrel on all grades has been made.

Most branches of trade have slightly increased in activity, and there seems to be a belief prevailing that there will be a thriving spring business.

Our iron foundries—especially those devoted to the manufacture of household articles—are becoming very busy. This is a most healthy sign of good times approaching.

The New York House of Assembly has passed the bill regulating commercial paper falling due on holidays. It increases the number of holidays, and makes paper falling due on those days, as well as Sunday, payable on the following day, instead of the preceding, as has been the usage among business men hitherto. The bill, it is supposed, will go through the Senate without opposition. By this new law, Washington's birthday is to be considered a public holiday.

A bill has also been introduced into the New York Legislature to prohibit the practice of voting by proxy at elections of directors for railroads, banks, &c. It is to be hoped that it will not pass, as it would do great injustice to stockholders residing at a distance from the places of elections, and whose votes can just as well be given by proxy as by coming 1,000 miles to vote in person.

It is feared that the *pro-rata* bill, to tax railroads, will become a law; if so, it will do no good to those who expect to profit by it.

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# THE RISE AND PROGRESS OF INVENTIONS.

## ADVICE TO INVENTORS.

During the period of Fourteen Years which has elapsed since the business of procuring patents for inventors was commenced by MUNN & Co., in connection with the publication of this paper, the number of applications for patents in this country and abroad has yearly increased until the number of patents issued at the United States Patent Office last year (1859) amounted to 4,175; while the number granted in the year 1845—fourteen years ago—numbered 502—only about one-third as many as were granted to our own clients last year; there being patented, through the Scientific American Patent Agency, 1,440 during the year 1859. The increasing activity among inventors has largely augmented the number of agencies for transactisg such business; and at this time there is scarcely a town of 4,000 inhabitants, but has its patent agent, patent lawyer, patent solicitor, or patent attorney, all of which terms are used to convey the same idea—viz., that their services are offered to the inventor or patentee for a pecuniary consideration.

In this profession, the publishers of this paper have become identified with the universal brotherhood of Inventors and Patentees at home and abroad, at the North and the South; and with the increased activity of these men of genius we have kept apace up to this time, when we find ourselves transacting a larger business in this profession than any other firm in the world. Year after year, we have increased our facilities for transacting patent business, by gathering around us a large corps of the most eminent engineers, draughtsmen and specification writers that can be procured. Among these gentlemen are those who have been connected with the United States and Foreign Patent Offices. The latest engagement we have made is the association with us of Hon. Charles Mason, formerly COMMISSIONER OF PATENTS, and favorably known to the Inventor as their friend and advocate. The memory of his acts while holding this high position will be cherished by many an honest inventor with gratitude as long as he lives.

The arrangement made with Judge MASON renders our facilities for prosecuting all kinds of patent business complete, however ample they were before; and without being accused of egotism, we may safely assert that no concern has the combined talent and facilities that we possess for preparing carefully and correctly applications for patents, and attending to all business pertaining to patents, such as Extensions, Appeals before the United States Court, Interferences, Opinions relative to Infringements, &c.

### FREE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable are advised to make a sketch or model of their invention, and submit to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

### PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh streets, Washington, by experienced and competent persons, under the direction of a gentleman who has spent a lifetime about the Patent Office. Over 1,500 of these examinations were made last year through this office, and as a measure of prudence and economy, we usually advise inventors to have a preliminary examination made. Address MUNN & CO., No. 37 Park-row, New York.

### CAVEATS.

Persons desiring to file a caveat can have the papers prepared on reasonable terms, by sending a sketch and description of the invention. The government fee for a caveat is $20. A pamphlet of advice regarding applications for patents and caveats furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

### HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention, if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition is composed for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fee, by express. The express charges should be prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park-row, New York.

### REJECTED APPLICATIONS.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of their case, enclosing the official letters, &c.

### FOREIGN PATENTS.

We are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business we have offices at Nos. 66 Chancery Lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that three-fourths of all the European patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency, the requirements of the different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our branch offices.

### INTERFERENCES.

We offer our services to examine witnesses in cases of interference, to prepare arguments, and appear before the Commissioner of Patents, or in the United States Court, as counsel in conducting interferences or appeals.

For further information, send for a copy of "Hints to Inventors." Furnished free. Address MUNN & CO., No. 37 Park-row, New York.

### THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Many persons have been ruined from adopting the "penny-wise and pound-foolish" maxim, when an investment of a few dollars, to have been informed of their rights, would have saved them much anxiety and money. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. Judge MASON assists in all examinations of this kind.

For further particulars, address MUNN & CO., No. 37 Park-row, New York.

### EXTENSIONS OF PATENTS.

Valuable patents are annually expiring, which might be extended, and bring fortunes to the households of many a poor inventor or his family. During the past fourteen years, we have had much experience in procuring the extension of patents; and, as an evidence of our success in this department, we would state that, in all our immense practice, we never lost but two cases—and those were unsuccessful from causes entirely beyond our control.

It is important that extension cases should be managed by attorneys of the utmost skill to ensure success. All documents connected with extensions require to be carefully drawn up, as any discrepancy or untruth exhibited in the papers is very liable to defeat the application.

Of all business connected with patents, it is most important that extensions should be intrusted only to those who have had long experience, and understand the kind of evidence to be furnished the Patent Office, and the manner of presenting it. The heirs of a deceased patentee may apply for an extension. Parties should arrange for application for an extension at least six months before the expiration of the patent.

For further information, as to terms and mode of proceedure in obtaining an extension, address MUNN & CO., No. 37 Park-row New York.

### ASSIGNMENT OF PATENTS.

The assignment of patents and agreements, between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

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It would require many columns to detail all the ways in which the inventor or patentee may be served at our offices; and we will close these somewhat lengthy remarks on patent matters by inviting all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of patentees will be cheerfully answered. Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

## ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING FEBRUARY 7, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

### 27,028.—Geo. S. Adler, of Philadelphia, Pa., for an Improvement in Machines for Polishing Leather:

I claim the rod, J, its projecting polisher, j, and the crank wheel, I, in combination with the rods, K L M and N, the whole of the above parts being arranged in respect to each other and to the horizontal bed of the machine as and for the purpose set forth.

### 27,029.—Frank A. Allen, of Portsmouth, N H., for an Improvement in Making Plaits in Sewing:

I claim my improved plaiting apparatus as made with the arrangement and application of the bars, A B C, and the clamp guide, H, as described.

I also claim the arrangement of the recess, a, between the bar, G, or the slider, H, and the table, D, when combined with the plaiting apparatus, constructed and operating substantially as specified; the same being so as not only to raise the bar off the table, D, but enable the under surface of the bar to lap on the cloth transversely of the plaits formed thereon, the same serving to hold the cloth and plaits to great advantage.

### 27,030.—John Allender, of New London, Conn., for an Improved Shoe and Bag-holder:

I claim the particular arrangement of the jaw, C, with reference to the other jaw or stock, A, by which the force used in pulling increases the pressure on the shoe or bag, substantially as set forth and described.

### 27,031.—Frazee Ayres, of Rahway, N. J., for an Improved Washing Machine:

I claim the arrangement of the fluted roller, C, raker or rincer, x x, and endless apron, O, with respect to each other and the other parts of the machine described, when operated in the manner and for the purpose specified.

### 27,032.—David Bickford, of Westerly, R. I., for an Improvement in Window Sash Supporters:

I claim the combination of the flat or sheet spring in combination with the bearings and friction roller, arranged so as to turn freely or stationary one way, as described in my specification.

### 27,033.—D. F. Boyd, of Mansfield, Ohio, for an Improvement in Defecating Cane Juices:

I claim the operation described with the result, using the steam which arises from the cane juice for pressure.

### 27,034.—John Butter, of Buffalo, N. Y., for an Improvement in Mowing and Reaping Machines:

I claim, first, The adjusting and supporting plate, D, in combination with the tubular arm, F', and lever, K, in the manner and for the purpose substantially as described.

Second, The gear frame, F, which consists mainly of the tubular arms, F1 and F2, the hollow cylindrical part, F3, collar, O, and upward projection, u', constructed arranged and operating in the manner and for the purposes substantially as set forth.

Third, I claim the combination of the shoe, M, gear frame, F, and plate, D, connected together in the manner and for the purpose substantially as described.

### 27,035.—Geo. W. Carter, of San Francisco, Cal., for an Improvement in Amalgamators:

I claim the amalgamation of gold with mercury by means of a machine which disperses finely divided dry auriferous ore at or near the bottom of a column of mercury substantially in the manner as set forth.

I also claim the means, substantially as set forth, for preventing agitation of the mercury, consisting of the tube, j, shield, k, and wings, l, whether the same are used separately or in combination.

### 27,036.—Ira Carter, of Champlain, N. Y., for an Improvement in Adjustable Carriage Springs:

I claim transmitting the weight of the load of a wheel vehicle to its spring, M, through the medium of an adjustable lever, J, and the lever frames, G G, or their equivalents, substantially as and for the purpose set forth.

[An engraving and description of this invention will be soon published in our columns.]

### 26,037.—John H. Crane, of Charlestown, Mass., for an Improved Spring Foundation for Beds, Sofas, &c.:

I claim the combination and arrangement of parts described, as forming an elastic foundation for the purpose set forth, the same consisting of the slats, c, curvilinear pieces, a, and links, b, acting together substantially in the specified manner.

### 27,038.—C. R. Davidson, of Brooklyn, N. Y., for an Improvement in Railroad Brakes:

I claim the arrangement of the grooved shoe, B, lever, A, cylinder, C, and spring, M, constructed as described, for operating brakes on the rails, as set forth.

### 27,039.—Edward B. Day, of Boston, Mass., for an Improvement in Braiding Machines:

I claim, when the spring and the ratchet and pawl are so arranged relatively to each other, that a stud or projection from and stationary relatively to the pulley cannot conveniently be made to actuate or trip the pawl, combining with the spring pulley and pawl a band or belt, d, provided with a ring, or its equivalent, the same being not only to admit of the movement of its tripping ring or device toward the pawl and away from the spring pulley, but to so connect the ring with the pulley that the retractive power thereof, or its spring, may be continually in action on the ring.

And I particularly claim the arrangement of the spring pulley, its lifter band and ring, so that the said band and ring may play within the spindle of the lifter while the pulley is arranged outside thereof, as set forth.

### 27,040.—Frank Douglas, of Norwich, Conn., for an Improved Steam Trap:

I claim, first, The arrangement of the double valve, B, its seats, s t, passages, c c, and connecting nozzle, d, relative to the outlet of the trap, substantially as described.

Second, The connection of the puppet valve with the float by means of one or more pairs of crossed levers, one pair applied to the valve stem and acting against fixed fulcra, as described.

Third, The spring, l, and adjusting screw, m, applied in combination with each other and with the valve, substantially as and for the purpose specified.

[An engraving and description of this invention will be found on another page.]

### 27,041.—R. H. Dunning, of North San Juan, Cal., for an Improvement in Gold Separators:

I claim the separator, F F, having a secondary or false bottom composed of bars or strips, G G, which bars are placed so as to have an opening, c c, between them, and over the opening or slats, b b, through the main bottom, the said separator being so arranged with reference to the receiver as to bring the said openings over the receiver; the whole arrangement being so inclined that a portion of the water and the auriferous particles will drop through into the receiver, while the larger gravel and rock will be discharged from the lower end of the separator, outside of the receiver, for the purposes substantially as described.

### 37,042.—Henry B. Fay, of New York City, for an Improved Paddle Wheel:

I claim the form and construction of the described and represented paddle wheel.

### 27,043.—Alfred M. Foote, of New York City, for an Improved Lock for Umbrella Stands:

I claim the combination of a stationary plate with the revolving lock plate, both of which are provided with notches for entering the umbrella, cane, or other article, when such plates are provided with suitable latches to retain the lock plate when turned, so as to enclose the article, as specified.

I also claim the combination of the latch, e, and check key, f, fitted and acting in the manner and for the purposes set forth.

I also claim the notch, 8, in the block, 7, combined with the latch, e, to afford additional security, as set forth.

### 27,044.—Jacob Fox, of Philadelphia, Pa., for an Improved Drill Chuck:

I claim a ball, divided into two or more parts, with a taper hole passing through its center, in combination with a tapered drill shank or spindle, substantially as specified, for the purposes set forth.

### 27,045.—Wm. A. Gibson, of New York City, for an Improvement in the Disengagement of Self-acting Brakes:

I claim the levers, E E, with the shoes, F F, attached, and connected to the slide bar, D, in connection with the lever, I; the above parts being applied to the vehicle, and arranged in relation with the draught-pole, H, substantially as and for the purpose set forth.

### 27,046.—Wm. B. Gillett, of Auburn, N. Y., for an Improvement in Method of Sharpening Files, &c.:

I claim the application of the electro-chemical process herein described, for the purpose of re-cutting or sharpening steel rasps and files in the manner aforesaid or any other substantially the same and which will produce the intended effect.

### 27,047.—R. D. Granger, of Albany, N. Y., for an Improvement in Cooking Stoves and Ranges:

I claim making the ovens of cooking stoves and ranges with one or more of the plates thereof made of cast iron with the inner surface thereof enameled, substantially as and for the purpose set forth.

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27,048.—Joseph M. Heard, of Aberdeen, Miss., for an Improvement in Moth Traps:

I claim the arrangement of the circular projecting top, D, lamp, C, formed of the triangular plates, c, phosphoric illuminator, E, and reservoir or basin, A, as and for the purpose shown and described; the whole being constructed as set forth.

[This invention consists in the employment or use of a lamp provided with a peculiar light, bait reservoir and cover, so arranged that moths or other winged insects that produce them are decoyed and effectually destroyed. The invention is chiefly designed for the use of agriculturists to destroy the insects that commit great ravages on growing crops and various kinds of fruit and other trees.]

27,049.—R. Heckscher, of New York City, for an Improvement in Coal Carts:

I claim, first, Arranging the box, F, of a coal cart with two or more compartments, b c, with their bottoms inclined longitudinally or at right angles to the axle, C, each with a separate door, g and h, in the end, substantially as and for the purpose described.

Second, The arrangement of the trap door, f, in combination with the compartments, b and c, and with the doors, g and h, constructed and operating substantially as and for the purpose specified.

Third, Forming the inclined bottoms of the compartments, b and c, with the curved end, e', as and for the purpose described.

[This cart is designed to enable one man to carry two or more tuns of coal to different parties at the same time and in the same cart; said cart being arranged with two or more separate compartments, each capable of taking one tun of coal, and so constructed that each compartment can be discharged with equal or better facility than an ordinary coal cart and independent of the other compartments.]

27,050.—Henry William Hindsley, of New Haven, Conn., for an Improvement in Piano-forte Keys:

I claim the combination of the glass with the composition when the two are connected without the use of any intervening adhesive substance and the article is constructed and fitted for use substantially as described.

27,051.—Silas H. Hodges, of Rutland, Vt., for an Improvement in Railroad Switches:

I claim a switch, c, and catch, e, used in connection with rails, all constructed and arranged as described; the switch being attached to the switch rod only by the catch, so that it will be held firm and insure an engine taking the side track for which it is adjusted, though it will be disengaged and thrown aside by an engine coming on the other track and leave it a free passage, as shown above.

27,052.—J. Hodgson, of Indianapolis, Ind., for an Improvement in Metallic Shutters:

I claim, first, The guides, D D, attached to the inner sides of the jambs, A, provided with expanded parts to form recesses, D', to admit of the folding of the slats, E, substantially as described.

Second, Connecting the slats, E, of the shutter together by means of the tubular pintle, b, in connection with the eyes, a, as set forth.

27,053.—A. D. Hoffman, of Belleville, Mich., for an Improved Cross Cut Sawing Machine:

I claim the combination with the buck, A, of the pivoted self-acting bed or saw carrier, B, gears, e f, lever, F, and treadle, G, as and for the purpose shown and described.

[The object of this invention is to obtain a simple and efficient machine for sawing wood transversely for fuel, designed chiefly for manual operation. The invention consists in the employment of a circular saw attached to a hinged or jointed bed, and arranged in such relation with a "buck" or wood-holder as to effect the desired end.]

27,054.—James M. Jay (assignor to himself and John Danner), of Canton, Ohio, for an Improved Egg-beater:

I claim, first, Making the case or shell of an egg-beater in the form of a hollow globe or sphere, substantially as set forth.

Second, I claim the combination of a circular beater or beaters with the parts, B and C, substantially as set forth.

Third, I claim the combination of the parts, G E and D F, with the parts, B C, substantially as set forth.

27,055.—Robert W. Jenks, Jr., of Providence, R. I., for an Improvement in Railroad Gates:

I claim the employment or use of the sliding and stationary plates, D E, slotted obliquely as shown, and having the journals, d, of the posts, a, fitted in the slots, substantially as and for the purpose set forth.

I also claim the means employed for operating automatically the sliding plates, D, to wit, the rods, F F', attached respectively to the bars, G H, the rods at either side of the track being connected by a lever, I, when said posts are used in connection with the swinging frames, K, attached to the sides of the locomotive or tender and elevated by the levers, L, and projections, l, of the frames, and the projections, o o', on the side of the track, as set forth.

27,056.—James Jones, of Rochester, N. Y., for an Improved Hinge:

I claim the use of the free movable ball, b, in combination with an inclined groove or channel, p, or of two reverse-inclined grooves in the joint or bearing surfaces of the hinge, substantially in the manner and for the purposes set forth.

I also claim forming the recesses, c c, at suitable points in the contiguous surfaces of the parts, in combination with the ball, b, for the purpose of fastening the hinge when opened, substantially as herein described.

27,057.—Wm. H. Lazelle, of New York City, for an Improvement in Converting Rotary into Reciprocating Rectilinear Motion:

I claim the combination with a rotary shaft, B, and a slotted rod or slide, C, of a compound crank, D c E F e f, constructed and applied substantially as described, in connection with a stationary eccentric or way, d, for the purpose of obtaining an irregular rectilinear movement of the said rod or slide by the rotary movement of the said shaft.

27,058.—John W. Lockwood, of New York City, for an Improved Head Rest:

I claim a supporter for the head by the combination and arrangement of the parts, A B B C C, and strap, D, substantially as above described.

27,059.—Chelton Matheny, of Greensburgh, Ind., for an Improvement in Hand Spinning Wheels:

I claim the arrangement of the vibrating arm which carries the spindle and its bearing so that said arm shall move in a horizontal plane and the spindle be sustained in the vertical position, substantially in the manner and for the purpose set forth.

27,060.—Thomas J. Mayall, of Boston, Mass., for an Improvement in Machine Belting:

I claim, as a new article of manufacture, machine belting made substantially in the manner and for the purposes described, with a friction surface formed partly or wholly of india-rubber or gutta-percha, while the cotton or other fabric which is thus covered is in a single sheet or ply and free from interposed rubber or other cement.

27,061.—Wm. S. Mead, of Buffalo, N. Y., for an Improvement in Apparatus for Generating Vapor in Lamps:

I claim the employment of the frustum, a, provided with a spiral thread and encased within the heater, C; the same being arranged substantially as and for the purpose specified.

27,062.—Joseph B. Maxwell and James A. Maxwell, of Alleghany, Pa., for an Improvement in Bellows:

We claim the arrangement of the flanges, c, attachment plate, g, recess, x, lugs or flanges, e, pivots, f, and self-acting valve, h, as described and for the purpose set forth.

27,063.—Wm. A. Morse, of Boston, Mass., for an Improved Pen Handle:

I claim the cylinder, F, in combination with the parts, A and D, and knife, H, when the whole is constructed and connected substantially as described.

27,064.—Emery Parker, of West Meriden, Conn., for an Improvement in Bolts for Door Locks:

I claim the manner of constructing and inserting the smaller locking bolt specifically as described.

27,065.—John Parker and Edmund Parker, of Meriden, Conn., for an Improvement in Coffee Mills:

We claim the manner described of preventing the grinding surfaces from coming in contact, that is to say, by so constructing the grinding cone that its smaller end shall come to a bearing against the plate, C, in the manner and for the purposes set forth.

We also claim the projecting piece, g, in combination with the enlarged portion of the delivery aperture for the purpose set forth.

We also claim the manner of affixing the hopper, specifically as described.

26,066.—Norman Platt, of Jackson, Miss., for an Improved Life-preserver:

I claim the employment of the bellows, C, or their equivalent in effect, secured to the body and sleeves of the preserver, and having a tube communicating with the air space of said preserver, and being so arranged as to be operated by the motion of the arms of the wearer in such manner as to inflate the preserver with air, substantially as and for the purposes set forth.

27,067.—Julien Quetil, of New York City, for an Improvement in Apparatus for Moving Heavy Weights:

I claim, first, The arrangement of the bridge, A, in combination with the lifting jacks, B and C, and with the frame, F, or their equivalents, substantially as and for the purpose specified.

Second, The combination with the frame, F, or its equivalent, and with the bridge, A, of the windlass, E, substantially in the manner and for the purpose set forth.

[The object of this invention is to transport heavy weights, such as large logs, blocks of marble or stone, heavy pieces of machinery, &c., from one place to another; and the apparatus covered by this patent is so arranged that such weights can be transported over even or rugged ground, and up hill and down hill, with equal facility.]

27,068.—Adolph H. Rau, of Philadelphia, Pa., for an Improved Station or Street-registering Indicator:

In combination with the rim or dial carrying the numbers or names of the streets or stations, I claim the devices, substantially as described, for turning and holding said rim or dial.

27,069.—Samuel Ray and M. R. Shalters, of Alliance, Ohio, for an Improved Combined Chair and Crib:

We claim the permanent bottom, A, supplemental bottom, B, permanent arms, D, and supplemental arms, E, with traverse frame, F, attached, and the turning and the sliding leg and rocker frame, formed of the bars, a a d and f f g; the whole being combined and arranged as and for the purpose set forth.

[The object of this invention is to combine a rocking chair and crib in such a manner that the device, by an extremely simple adjustment, may be used in either capacity equally as well as if it were made for either purpose only, thereby forming an economical and very convenient article of household furniture.]

27,070.—August Reichard, of Washington, Mo., for an Improvement in Pumps:

I claim a combination of the valve, B, and lever, L, valve, V, and its rod and rest, T, with the hollow plunge or piston, P, arranged and operating substantially as described.

27,071.—Henry A. Ridley, of Somerville, Tenn., for a Rat Trap:

I claim operating the doors, B and C, by the rods and levers, 2 u I', in combination with the cog sector, F, and interrupted cog wheel, E, and click wheel, G, when operated by the spring, L, or its equivalent, in the manner described and for the purpose specified.

27,072.—Auguste Rolland, of Toulouse, France, for an Improvement in Fertilizers:

I claim the mode or method of manufacturing a fertilizing compound by the employment of the ingredients set forth, substantially as and for the purpose described.

27,073.—W. H. Rounds, of Campello, Mass., for an Improved Machine for Trimming, Chamfering and Skiving Leather:

I claim, in combination with a feeding and gaging mechanism, the slotted arc, H, and knife stock, I, so that the knife or cutter, f, may have the range of adjustment represented to adapt the machine to the varied purposes mentioned, substantially as described.

27,074.—Charles A. Ruff, of Boston, Mass., for an Improvement in Skates:

I claim an improved skate as made or provided with clamping devices, by which it may be clamped, substantially as described, to the edge of the sole or bottom edge of the sole and heel of the shoe or boot of a person.

I also claim the combination and arrangement of the toe clamp, the lateral lever clamps, the wedge and the screw, to operate substantially as described.

I also claim the combination of the movable toe clamp with the heel abutment, a, and the adjustable toe clamp, such clamps being provided with screws or equivalents for moving them, as desbribed.

27,075.—Solomon Ruthenburg, of Indianapolis, Ind., for an Improvement in Shingle Machines:

I claim the guide clicks, c c, when constructed as set forth, in combination with the vibrating block table, O, through lever, L, operating in conjunction with my machine, substantially as set forth in the foregoing specification.

27,076.—J. C. Rutherford, of Derby Line, Vt., for a Solution for Toning Photographs:

I claim the toning solution composed of the within-specified materials, combined in the manner as and in about the proportions set forth.

[This invention greatly cheapens the process of toning photographic pictures; the work is instantaneous, a sharpness is given to the picture that cannot be obtained by any other method, and the operation can be performed in a clear light, without injury to the solution or the print.]

27,077.—S. W. Ryckman, of Pontiac, Mich., for an Improvement in Corn-shellers:

I claim, first, The elastic apron, G, provided with plates or buckets, g', and strips, h, in connection with the cylinder, C, plates, f, and inclined bed-piece, E; the whole being arranged for joint operation substantially as described.

Second, The yielding bar, I, placed at the inner end of the feed trough, H, and arranged to operate in combination with the apron, G, as and for the purpose specified.

[This invention consists in the use of a rotary toothed cylinder, elastic bearing plates, inclined bed-piece, endless feed apron, and a fan, so arranged that the desired work, to wit, the shelling of corn, may be done very expeditiously and in a perfect manner.]

27,078.—W. W. Skinner, of Davenport, Iowa, for an Improved Machine for Bending Mold Boards for Plows:

I claim the stave, I (or staves, I), roller, Q, bolts, K, and movable set screw, L, when combined, arranged and operated in the manner and for the purpose set forth.

27,079.—Josiah M. Smith, of Somers, N. Y., for an Improvement in Sewing Machines:

I claim the arrangement of the bars, C and G, and the connecting rod, H, as shown, for the purpose of operating, at their proper times, the two needles, as described.

27,080.—V. O. Spencer and J. R. Spencer, of Mansfield, Pa., for an Animal Trap:

We claim the revoling partition, C, within box, A, actuated by the cord and weight, or its equivalent, the spring treadle or platform, D, with catch, h, attached, the bait-box, I, and the opening, a, in the compartment, d; the whole being combined and arranged as and for the purposes specified.

[This invention relates to an improved self-setting trap, and is more especially designed for catching rats and mice. The invention consists in the use of a revolving partition placed within a suitable box, and provided with a treadle catch, bait-box, and a discharge opening, whereby the device may be placed over a barrel or other suitable vessel, containing water, and the animals not only entrapped but destroyed at the same time; the trap setting itself after each operation of entrapping.]

27,081.—E. H. Stearns, of Cincinnati, Ohio, for an Improved Method of Rossing Saw Logs:

I claim, first, The combination of the rotary and drawing cutters, C V, with a movable carrier, A or R, made governable with reference to the uneven surface of the log, substantially as and for the purpose set forth.

Second, I claim the arrangemsnt of the rotating roller, G, in combination with the lever, L, or its equivalent, so as to be operated thereby substantially as and for the purpose set forth.

27,082.—John Thomson, of Worcester, Mass., for an Improvement in Sewing Machines:

I claim the combination of the shield or needle guide, h, with the spring finger, i, in the manner and for the purposes specified.

27 083.—Wm. Tinsley, of New York City, for an Animal Trap:

I rest my claim upon the self-setting escapement of the pillar, with its three arms, as set forth.

27,084.—Phineas Topham, of Newark, N. J., for a Price Indicator.

I claim combining with a series of figures, B, or its equivalents, a number of hinged strips, b, with additional hinged strips, c, or their equivalents, substantially in the manner and for the purpose specified.

[The object of this invention is to indicate the varying prices of different goods by a simple arrangement, and by its aid the price of meat and vegetables, or any other article, can be indicated in cents and in fractions of cents as may be desired.]

27,085.—Elmer Townsend, of Boston, Mass., for an Improvement in Pegging Machines:

I claim, first, Pointing the peg on the pegging machine, substantially as described.

Second, I claim the inclined knives, N, operating substantially as set forth, to cut the peg from the blank.

27,086.—Charles B. Wood, of New York City, for an Improvement in Attaching Carriage Thills:

I claim the clips, C, formed of two longitudinal parts, a b, to admit of being securely fitted to the bed, B, and axle, A, in connection with the eyes, D, attached to the thills, and arranged so as to encompass the clips, substantially as destribed.

[This invention consists in having cylindrical clips attached to the front axle of the vehicle, and encompassing both the bed and axle; and having eyes attached to the inner ends of the thills, which are fitted on the clips and allowed to turn freely thereon; the whole being so constructed, arranged and applied to the vehicle that a very secure connection of the thills and axle is obtained, and one that will not permit of its parts working or wearing loose so as to cause the disagreeable rattle peculiar to the ordinary connections after they become a little worn by use.]

27,087.—Charles B. Wood, of New York City, for an Improvement in Safety Straps for Securing Carriage Thills:

I claim the strap, F, formed by two parts, c d, provided with a ring, e, and applied to the axle and thills, substantially as and for the purpose set forth.

[This invention relates to an improvement in straps that are attached to the thills and axles of vehicles in order to guard against accidents that might occur from the breaking of the permanent metal connections used for securing the thills to the axles. The object of the invention is to form not only a supplemental or auxiliary attachment of the thills to the axle, but also to obtain a fastening for the parts of the eyes or metal connection that are attached to the thills, in case the same should become detached from the thills.]

27,088.—Philander Daniels, of Le Roy, N. Y. (assignor to Clark Daniels, of same place), for an Improvement in Tanning:

I claim my improved process of tanning, consisting in combining with the tanning solution tartaric acid, sal soda and bi-chromate of potash, substantially in the order, proportion and manner specified.

27,089.—C. H. Thompson, of Orange, Mass. (assignor to himself, George Carpenter and J. S. Emery, of same place), for an Improved Tuyere:

I claim the forked valve, E, constructed, arranged and operating in combination with the perforated top of the air-box, substantially as set forth and for the purposes described.

27,090.—Albert C. Richard, of Newtown, Conn., for an Improved Wrench:

I claim the peculiar construction and arrangement of the screw wrench described, having the shank, a, made broad near the outer or fixed jaw, h, and provided with the female screw or nut, f, as part of said shank, in combination with the sliding jaw operated by a screw, substantially as set forth for the purposes described.

RE-ISSUES.

R. C. Bristol, of Chicago, Ill., for an Improvement in Slide Valves for Steam Engines. Patented June 21, 1859:

I claim the construction and arrangement of the partial rollers, E, when sustained in their respective positions, substantially in the manner and for the purposes set forth.

I also claim providing a slide valve with lips, B 2, and stops, B 4, substantially as shown and described, for the purpose of sustaining the pressure of the steam thereon upon the rolling supports, E, or their equivalents, and of confining the rolling supports to prevent their becoming displaced.

I claim the described arrangement of the supported back piece, B, loose face piece, A, cut-off means, D, and the united passages, a b ab,

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in the respective parts, A B, whereby the parts, A B, are allowed to work to a limited extent relatively to each other without affecting the action of the steam, nor allowing any escape of the same through the joints.

I likewise claim rigidly connecting the parts, A and B, after they have been properly adjusted by means of the set screws, C C, or their equivalents, substantially as and for the purpose set forth.

R. S. Mershon and John M. Harper (assignees of Ralph S. Mershon), of Philadelphia, Pa., for an Improved Regulator for Timekeepers. Patented April 26, 1859:

We claim the application to watches, and such time pieces as have their vibrations governed by a balance and hair spring, of a compound regulator, composed of two or more segments, constructed and operating substantially as described.

We also claim the combination of said compound regulator, with one or more indicating deuces, by which the movement of said regulator may be adjusted or defined, substantially as described.

Richard L. Nelson, of Ocala, Fla., for an Improved Mode of Attaching Life-preservers to Vests. Patented November 21, 1854:

I claim, first, An air-tight bag or pad that may be introduced or removed from between the face and lining of a vest, or other similar garment, at pleasure, without disturbing any of the seams of said garment or impairing its utility as a garment to be worn without said bag or pad, substantially as described.

Second, I also claim, in combination with an air-bag or pad, to br applied to vests or other garments, the tube or channel, C, when said tube or channel is formed by a continuation of the sides or walls of the bag or pad, and without a seam or other artificial connection or union therewith, substantially as described, for the purpose mentioned.

Joseph R. Palmenberg, of New York City, for an Improved Frame for Ladies' Dresses. Patented January 10, 1860:

I claim, first, The arrangement and construction of ladies' figures in parts, and the manner of fastening the separate parts together, substantially as described and for the purpose specified.

Secondly, I claim the arrangement and construction of the stand and feet for ladies' figures, made in parts in the manner described and for the purposes substantially as set forth.

N. C. Sanford, of Meriden, Conn., for an Improvement in Skates. Patented February 20, 1855:

I claim, first, Attaching the runner, B, to the stock, A, by means of the posts or knees, c* c*, welded or firmly connected to the runner and passing through the stock, and having screw threads, g, formed on them to receive nuts, h, in connection with the sockets, d, or any suitable shoulder or bearing surface placed on the posts or knees, substantially as described.

Second, Having the stock, A, of the skate formed of two parts, a b, connected by a spring, c, when said stock is combined or used in connection with an elastic or spring runner, B, for the purpose set forth.

[This invention consists in a novel way of connecting the runner of the skate to the stock, whereby a very fine and substantial connection is not only made, but also a very simple and economical one The invention also consists in having the stock of the skate formed of two parts connected by a spring, and having the runner so made as to be elastic, whereby the skate is made to yield or give, so that its back part will rise with the heel when the weight of the body is thrown upon the front part of the skate upon which the ball or front part of the foot rests.]

John T. Whitaker and Calvin D. Read, of St. Charles, Ill., for an Improvement in Reaping and Mowing Machines. Patented August 11, 1857:

We claim a tubular finger bar, when constructed in the peculiar manner and for the purposes substantially as set forth.

John D. Whitaker and Calvin D. Read, of St. Charles, Ill., for an Improvement in Reaping and Mowing Machines. Patented August 11, 1857.

We claim the peculiar arrangement and combination of the raker's seat or stand, l, and wheel, F, with the finger bar and frame, A, whereby the weight of the raker is made to counterbalance the weight of the outer end of the latter platform and frame, substantially as set forth.

John D. Whitaker and Calvin D. Read, of St. Charles, Ill., for an Improvement in Reaping and Mowing Machines. Patented August 11, 1857:

We claim mounting the driving wheel upon a tubular stud secured to the side of a single frame beam, in the manner substantially as set forth, whereby the outer frame beam is dispensed with, and the reel still driven by the direct motion of the wheel as described.

John T. Whitaker and Calvin D. Read, of St. Charles, Ill., for an Improvement in Reaping and Mowing Machines. Patented August 11, 1857:

We claim loosening and tightening the reel belt by means of the pulleys, g g', screw, h, and guide frame, j; the whole being arranged upon the harvester frame and operated in the manner substantially as set forth.

# Notes & Queries

E. F. B., of N. Y.—We are much obliged for your contribution, but we deem it unfair to open our columns, under ordinary circumstances, to correspondents to criticize articles in other journals. We prefer to do that ourselves, if the subject warrants such notice.

J. S., of N. Y.—Brass for castings should be melted in a crucible in a proper furnace, and when a lambent flame is seen on the surface of the metal the crucible should be taken from the furnace, to prevent the zinc passing off as gas. The molten brass should then be poured into the mold, which is generally made of sand, with plenty of vent holes to let out the air and moisture. Brass molds are also used, and in order to enable the castings to leave them easily, they are brushed previously with a thin film of turpentine or sweet oil. Corn meal and charcoal dust are employed to "face" sand molds; but if the brass is very hot and remains long in contact with such molds, "sand-burning" takes place, and the face of the casting is injured. The lowest heat of the metal, to take a sharp impression and prevent sand-burning, is determined by the skill of the molder—his practiced eye knows the right color of the metal for pouring into the mold.

W. F. S., of Va.—We are not acquainted with any safe antidote which may be used in your steam boiler to prevent the injurious action of the sulphuric acid in the water upon the metal. Lime will combine with the acid and form sulphate of lime, but this would soon form a hard scale in the boiler. Your feed water can be purified by heating it (prior to entering the boiler), then agitating it with a small quantity of the peroxyd of iron, or lime, or soda, but this process would perhaps be too expensive for you to practice. A little soda ash added to the boiler from time to time will afford a partial remedy.

G. B., of N. Y.—It is not our intention ever to sneer at correspondents; we mean to treat them kindly, even when their ideas do not command our respect. Your explanation of the mystery of vegetable life is not sound. Plants are composed almost wholly of the four organic elements—oxygen, nitrogen, hydrogen and carbon, and these weigh just as much when they are floating in the atmosphere as when they constitute a log of oak or maple. This is no theory, as they have been very carefully weighed a great many times. It is owing to the fact that they are "ponderable" that the water rises in a suction pump, that the column of mercury is sustained in a barometer, and that power is gained by condensing the steam in a low pressure engine. You may try an experiment yourself that will satisfy you that plants absorb carbon from the air. Plant a tree in a pot, water it with boiled water which will convey to it no carbon, and after it is grown over the trunk and limbs to protect them from the air, and expel the volatile portions by heat; the solid substance remaining will be charcoal, which is almost pure carbon. If the experiment is properly conducted you will find that this charcoal weighs more than the earth in the pot has lost in weight.

J. P. L., of Ala.—Galvanized iron plates for salt boilers would be of no advantage. The brine would soon attack the zinc and convert it into chloride, which is very soluble.

G. B. F., of N. Y.—Polished steel, when heated (without exposure to flame) up to about 560° Fah., becomes a deep blue color, which it retains when suddenly cooled. This is the common method of blueing steel. By covering the parts with soap which are desired to remain bright, you can have blue and bright spots on the same piece of steel. We are not acquainted with any method of frosting steel.

L. I., of Mass.—Lanterns have been constructed with movable guards, but it is quite possible that you might have a novel way of arranging them. You had better send us a model. Your knife-board, we think, is old, or does not possess sufficient novelty to warrant the issuing of a patent. Still, we might form a different opinion on inspecting a model. You could, undoubtedly, obtain a patent on the design of your paper rack, but not on the rack itself.

W. H., of Ohio.—The best way of tempering picks known to us is to heat them to a full red heat, then plunge them in a pickle of salt brine. Many blacksmiths find great difficulty in tempering mill picks, because they do not choose proper steel for the purpose. All steel should be heated as quick as possible in tempering, as long exposure to heat injures its texture.

P. K., of Wis.—The hollow bricks mentioned in the "Annual of Scientific Discovery" for the years 1850, 1853 and 1857, you say, are never seen in the West, and ask us the reason. As you remark, they are well worthy the attention of builders everywhere, and we know no reason why they are not introduced.

G. W. C., of N. Y.—The pressure of a given weight of steam is in inverse proportion to its volume; that is, double the volume has half the pressure. If steam in a cylinder at 50 lbs. pressure is cut off at ¼ stroke, the pressure at half stroke will be 25 lbs.

J. G., of Ind.—It is not theory but observation which shows that growing plants absorb carbonic acid in the daylight. It is also by observation that we learn that vinous fermentation is accompanied by the growth of a microscopic plant. This fermentation converts sugar into alcohol, 100 lbs. of sugar being converted into 47 lbs. of carbonic acid, 49 of alcohol, and 4 of carbon. Cane sugar is composed of 72 lbs. of carbon, 9 lbs. of hydrogen and 72 lbs. of oxygen (C12 H9 O9); alcohol is composed of 24 lbs. of carbon, 6 of hydrogen and 16 of oxygen (C4 H6 O2); and carbonic acid is composed of 6 lbs. of carbon to 16 lbs. of oxygen (C O2).

F. O. F., of Pa.—You will find useful information about hair dyes on page 342, Vol. XIV. (old series), of the SCIENTIFIC AMERICAN.

G. M., of N. Y.—If Mr. Bullock wishes his press brought to the notice of our readers, he can do so by having it illustrated in our columns.

J. L. N., of Va.—We do not know the address of any one engaged in the manufacture of broom machines. Write to John Wiley, bookseller, of this city, about a work on painting.

J. H., of Ind.—Write to the "American Railway Review," this city.

W. A. D., of Iowa.—Walnut putty is an article which we do not know.

T P P., of Mass.—We are not aware that the United States government ever bestowed a pension on a man for a discovery, and we hope never to see the precedent established, as it would be certain to be abused through personal and political favoritism. Let our admirable patent system be perfected, and the reward for really valuable improvements will be about as effectually secured as it can be by any human institutions.

C. O. F., of Orrington.—We find it best to sit with the back to the light in reading, unless an opaque shade is used to screen the eyes from the direct action of the light.

J. L. P., of Conn.—The proper size for your conducting pipe depends on the size of the jet; it should be much larger than the jet. If your fountain is properly constructed, the water will rise within about two feet of the surface of the water in your hogshead.

A. & C., of Iowa.—We do not know how the ink spoken of is made.

J. C., of Va.—Send us a sketch and description of your invention, and we will examine it and report our opinion of its novelty.

T. H. McCulloch.—Please to inform us of your post-office address and we will write to you. Your letter is silent on this subject.

R. D. S., of Va.—Your diagram of the cracks caused by freezing in clay, showing that they are formed in every possible direction, confirms our opinion in regard to the matter The statement that these cracks always occur in one direction seemed to us exceedingly improbable.

J. W., of Mass.—We have known more than one boiler to jump out of its bed in the case of an explosion, and fly away through the air. It is very common.

W. N. M., of Va.—The power of water is in proportion to the fall and the weight of water. If you have a given amount of water falling 22 feet, it will take twice as much fall 11 feet to produce the same power. In comparing the two falls you must measure only the hight through which the water is acting on the wheel. We think Tyler's a very good wheel. The experiments now being made in Philadelphia will, however, be a better guide than any one's opinion.

C. C. P., of Ohio.—In evaporating salt brine, the most economical method is to employ long shallow pans, and allow the brine to have a gradual circulation from the back to the forward crystallizing pan. Steam always escapes most freely when there is but a thin column of water above the bottom of the pan.

J. G. P., of Pa.—No gain of power is obtained by the two pistons, either in the arrangement shown in your sketch or in a reciprocating engine. When a stationary cylinder head is used the whole force is exerted on the one piston, but if two pistons are used only half the force is effective on each. The effect is like that of a lever with its fulcrum receding. The same quantity of steam will be necessary to move the two pistons six inches each as to move the one a foot, and the same effect is produced.

## Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Feb. 11, 1860:—

J. B. & W. W. C., of N. Y., $100; G. & McC., of Ohio, $25; T. H. W. & Bro., of Ga., $35; H. U., of N. Y., $45; C. E. G., of Minn., $35; J. A., of La., $25; C. S., of Conn., $25; W. S. H., of Mo., $30; J. M. H., of Miss., $25; L. C. of Mass., $25; L. & B., of Mich., $30; J. H. D., of Conn., $30; A. C. R., of N. Y., $55; J. P., of N. J., $5; L. G., of N. Y., $25; F. W., of N. Y., $30; W. C., Jr., of Iowa, $30; M. S. P., of Mass., $25; G. W. G., of Conn., $30; R. H., of Mass., $30; J. Y. H., of Pa., $20; A. H., of Iowa, $15; D. S. H., of Ill., $10; W. H. S., of Conn., $30; M. R., of N. Y., $35; C. H., of L. I., $25; W. B. B., of La., $20; J. H. W., of N. J., $12; J. N., of Pa., $25; J. A. C. J.S., of Pa., $30; G. P., of Pa., $20; W. E. R., of Mass., $25; D. K., of Pa., $25; F. D., of Conn., $30; W. H. S., of Conn., $30; R. A. S., of N. Y., $25; S. C. T., of Ga., $55; P. B. W., of Ga., $30; A. S., of N. Y., $50; A. T. T. & Co., of N. Y., $30; I. H., of Pa., $35; G. W. & Co., of N. Y., $40; D. D., of N. Y., $20; C. & P., of Ind., $25; D. S. McK., of N. Y., $35; C. & W., of N. Y., $35; J. L. H., of Conn., $30; G. C. D., of Ohio, $25; D. B., of Va., $20; A. H. S., of N. H., $33; N. T. S., of N. Y., $30; A. C., of N. Y., $85; A. A. M., of N. Y., $25; H. & P., of N. Y., $30; J. G., of Ga., $25; J. F. H., of Ill., $50; E. B. R., of N. J., $35; K. C. C., of N. Y., $30; J. G. P., of Pa., $25; G. & W., of Mich., $10; D. N., of Iowa, $30; W. G., of Wis., $33; A. O., of N. H., $30; A. H., of Md., $30; S. & S., of Vt., $30; R. A. S., of N. Y., $10; F. D. B., of Mass., $37; H. F., of La., $30; L. D. B., of N. Y., $30; C. H. W., of N. Y., $30; J. H. G., of Ky., $25, G. F. L., of N. Y., $30; S. H. H., of R. I., $30; S. C. S., of Ill., $25; J. B. McE., of Pa., $25; S. McG., of Ind., $30; A. W. M., of N. Y., $30; T. F., of N. Y., $25; C. & G. M. W., of N. Y., $25; I. R., of N. Y., $55.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Feb. 11, 1860:—

J. N., of Mass.; W. J. McC., of N. Y.; G. C. & W., of Tenn.; J. M. H., of Miss.; C. S., of Conn.; J. A., of La.; L. C., of Mass.; M. S. P., of Mass.; L. G., of N. Y.; S. C. S., of Ill.; W. B. B., of La.; A. H., of Iowa; G. & McC., of Ohio; A. C., of N. Y. (3 cases); J. G., of Tenn.; T. F., of L. I.; J. G. P., of Pa.; D. K., of Pa.; C. H., of L. I.; E. B. R., of N. J.; J. H. G., of Ky.; C. & G. M. W., of N. Y.; J. B. McE., of Pa.; H. & P., of N. Y.; J. A., of La.; H. U., of N. Y.; P. G. W., of Pa.; G. P., of Pa.; W. E. R., of Mass.; R. C., of Ind.; G. & W., of Mich.; C. H., of La.; F. D. B., of Mass.; A. A. M., of N. Y.; D. B., of Va.; G. C. D., of Ohio, J. R., of N. Y., A. C. R., of N. Y.

## Literary Notice.

THE POSTAL GUIDE.—The second number of this reliable guide to persons having business with the Post-office, is published by Conner & Holbrook, General Newspaper Advertising Agents, No. 7 Park-row, this city.

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## IMPORTANT TO INVENTORS.

THE GREAT AMERICAN AND FOREIGN PATENT AGENCY.—Messrs. MUNN & CO., Proprietors of the SCIENTIFIC AMERICAN, are happy to announce the engagement of HON. JUDGE MASON, formerly Commissioner of Patents, as associate counsel with them in the prosecution of their extensive patent business. This connection renders their facilities still more ample than they have ever previously been for procuring Letters Patent, and attending to the various other departments of business pertaining to patents, such as Extensions, Appeals before the United States Court, Interferences, Opinions relative to Infringements, &c., &c. The long experience Messrs. MUNN & CO. have had in preparing Specifications and Drawings, extending over a period of fourteen years, has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, on sending a model or drawing and description to this office

Consultation may be had with the firm, between NINE and FOUR o'clock, daily, at their PRINCIPAL OFFICE, No. 37 PARK ROW, NEW YORK. We have also established a BRANCH OFFICE in the CITY OF WASHINGTON, on the CORNER OF F AND SEVENTH-STREETS, opposite the United States Patent Office. This office is under the general superintendence of one of the firm, and is in daily communication with the Principal Office in New York, and personal attention will be given at the Patent Office to all such cases as may require it. Inventors and others who may visit Washington, having business at the Patent Office, are cordially invited to call at their office.

They are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business they have Offices at Nos. 66 Chancery Lane, London; 29 Boulevard St. Martin, Paris, and 26 Rue des Eperonniers, Brussels. We think we may safely say that three-fourths of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

A pamphlet of information concerning the proper course to be pursued in obtaining Patents through their Agency, the requirements of the Patent Office, &c., may be had gratis upon application at the Principal Office or either of the Branches. They also furnish a Circular of information about Foreign Patents.

The annexed letters from the last two Commissioners of Patents we commend to the perusal of all persons interested in obtaining Patents:—

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Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements. Very respectfully,

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MESSRS. HOARD & WIGGIN.—Dear sirs: I have in use at my works one of your steam traps. I consider it a very valuable machine for the purpose for which it is intended, and it gives me entire satisfaction. Very respectfully yours,

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A MESSIEURS LES INVENTEURS—AVIS IMportant.—Les inventeurs non familiers avec la langue Anglaise, et qui prefereraient nous communiquer leurs inventions en Francais, peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront recues en confidence.

MUNN & CO., Scientific American Office, No. 37 Park-row, New York.

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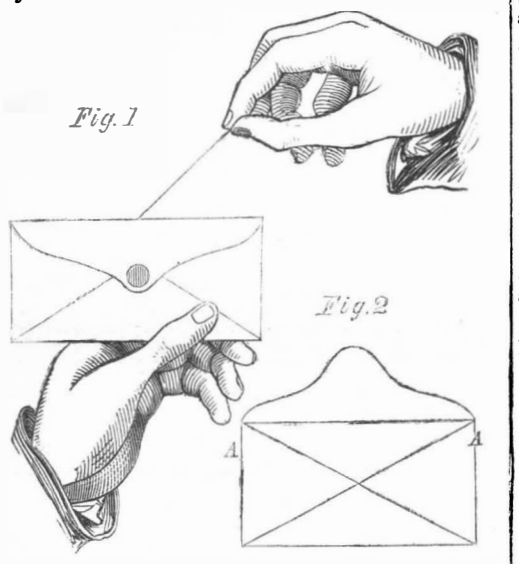
## PHELPS' ENVELOPE-OPENER.

Every person who is in the receipt of a large number of letters by mail is aware of the vexation caused, and the amount of time consumed, in the opening of letters. Various means are resorted to, to accomplish this end; such as picking the envelope open with the fingers, others institute a vigorous search for the scissors or a knife, by the aid of which, after more or less damage to the envelope or contents, they effect an entrance. The object of the invention in our illustration is to obviate




all this trouble; and it is successfully obtained by attaching an "opener" to the envelope, by which a ready means of opening it is always at hand. The manner in which it is attached, and its advantages, will be more readily understood by an examination of the annexed engravings.

In Fig. 2, the "opener," a small cord or thread, is seen extending across the envelope, lying in the crease formed by the folding of the flap, and permanently attached to it from A to A; its ends projecting beyond the paper, in order that one of them may be readily seized when necessary. The operation is as follows: the envelope being being firmly held in one hand, the end of the thread is seized by the other, and pulled in such a way as to cause it to cut or tear itself out as it is pulled, as shown at Fig. 1, where it is in process of being operated and the envelope partly opened. If preferred, the "opener" can be placed at the end or bottom. Its operation is instantaneous, and without injury to the envelope or contents. It is easily applied, and at very small cost.

For any further information, address the inventor, Charles Phelps, Salem, Mass., who obtained a patent on April 27, 1858.

## ZOOLOGICAL AND BOTANICAL GARDEN.

A number of wealthy and influential gentlemen of this city, among whom are August Belmont, W. H. Aspinwall, Hamilton Fish, Alexander W. Bradford, Geo. Folsom, and Benjamin R. Winthrop, have organized an association for the establishment of a great Zoological and Botanical Garden in the Central Park, and have appointed a committee to apply to the Legislature for a charter, and to take other necessary preliminary measures for the realization of the plan. If this scheme is carried into practical effect it will afford a greater attraction to our own citizens, as well as to the thousands of strangers who visit us weekly, than any which the city now possesses. The gardens of the Zoological Society in Regent's Park, London, and the Jardin des Plantes, in Paris, have been visited by millions of people, who find in these magnificent collections of natural history, not only a pleasant and innocent amusement, but the most rapid and impressive instruction in regard to the animals and plants of our globe. The Jardin des Plantes has connected with it very extensive geological, anatomical and botanical museums, and collections of specimens in every department of natural history, which, as well as the learned lectures on the subject, are all open to the public without any charge whatever. The Paris establishment is supported by government, but the London society is a joint stock corporation, and they make a small charge for admission. Some of the lakes in the public parks, in the vicinity of Paris, swarm with enormous carp, and one of the most amusing exhibitions that we ever witnessed was a struggle of these voracious fish for a loaf of hard bread thrown into the pond. As the greedy swarm rushed for the food, they lashed the water into foam with their efforts.

We earnestly hope that the attempts to introduce an educational feature into our great Central Park, by establishing there a first-class astronomical observatory, and a complete collection of natural history, will be crowned with success. There is no way in which our citizens who have the power can more wisely manifest their public spirit, their interest in the honor and prosperity of the city, than by aiding these efforts. These, added to the commercial renown and well-known liberality and enterprise of our city, will render it one of the most attractive places of resort to be found in the whole world.

## SELF-CLOSING INKSTAND.

The annexed engravings illustrate an inkstand which is closed by the two pieces, *a a*, so fashioned as to form, when closed, a cone with the apex pointing downward. These pieces are hung on pivots, *c c*, and pressed together by the spiral springs, *b b*, which are so feeble as to allow the cone to be opened by the pressure of the pen, and when the pen is withdrawn they press the two halves of the cone together, closing the inkstand.

Fig. 1

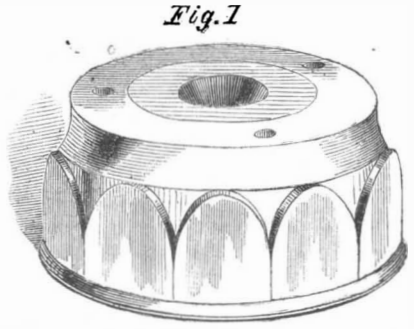
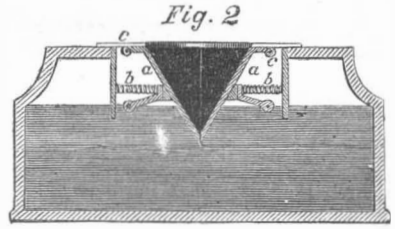


Fig. 2




The patent for this invention was secured through the Scientific American Patent Agency, and any person wishing to obtain further information in relation to it, will please address the inventor, James R. Ender, at Trenton, Washita parish, La.

## THE POWER OF WATER.

The "horse-power" of a waterfall is found by multiplying the quantity of water (in pounds) which falls in a minute into the perpendicular hight of the fall (in feet), and dividing the product by 33,000. The value of a horse-power amounts to 33,000 lbs., lifted one foot high in a minute; therefore the working horse-power value of a waterfall consists in the quantity of water which comes from the top to the foot of the fall in one minute. Thus:—"What is the horse-power of a fall of water 30 feet high, with one cubic foot flowing over it per second?" Answer:—$60 \times 62.5 \times 30 \div 33{,}000 = 3.40$ horse-power. From this, 25 per cent, at least, should be deducted for friction, leakage, &c., leaving 2.55 as the actual power that may be obtained by a wheel. There are $62\frac{1}{2}$ lbs. of water in a cubic foot; 60 feet fall in a minute. This quantity (in pounds) is multiplied into the perpendicular hight, and divided by the standard of a horse-power.

But how can we find out the quantity of water which falls in a given time? It is impossible to measure it with a gallon or other standard vessel; is there not some simple method of finding this out? There *is* a simple method determined long ago by experiment to be sufficiently accurate for common purposes. For example: if we take a vertical trough 30 feet high, and make a slit 24 inches long by 6 inches wide in its bottom, how much water will flow out of it in a second, when it is kept constantly full? The following is the formula employed for ascertaining this:—$Q = \sqrt{30} \times 5.5\ a \div 1{,}728$. That is, Q is the quantity which falls per second, it is equal to the square root of the hight multiplied by the co-efficient, 5.5, and the section, *a*, in inches (144) of the opening, divided by the number of inches in a cubic foot. This gives 2.5 cubic feet flowing through the opening per second. This being worked out by the first method above, gives 6.67 nominal horse-power. The following is an explanation of the result:—If a ball of lead be dropped from a high tower, it falls 16 feet in one second, and has acquired a velocity of 32 feet. It falls in the next second 48 feet, and thus, in two seconds, it has fallen $16+48=64$ feet; so that if the time be represented in seconds (thus, 1″, 2″, 3″, 4″, 5″), the spaces fallen through in each second will be as 1, 3, 5, 7, 9; and the spaces fallen through in the whole time will be as 1, 4, 9, 16, 25. This proportion holds good for any space through which a body falls in a vacuum, and a close vertical water flume may be regarded as such for practical purposes. The velocities, therefore, are as the square roots of the hights or spaces through which a body falls. Therefore, as gravity produces the velocity of 2 in descending through a space of 1, the hight (in feet) through which the body falls being multiplied by 64, will give the square of its velocity (in feet) per second. If the hight fallen be 1 foot, the square root of 64 is 8, which is the velocity with which a heavy body falls through that space. The square root of 30 is 5.47, which is multiplied above by 5.5, instead of 8, because experiments have determined that when water flows through rectangular notches there is a retardation of its velocity amounting to 2.5 of 8. The foregoing is given as data for any person to calculate the power of falls of water. We have received several letters lately, in which inquiries have been made as to the horse-power of certain falls, the property of our correspondents; and we answer a number by the above, which will also be useful to the general reader. By placing a notched beam or *weir* at the top of a fall, the same rule will enable any person to calculate the quantity of water flowing through it, without much trouble or expense.

There may be persons who have high falls on side-hills, with a small supply of water led down by tubes. In such cases, small turbine wheels may be employed, at but a little cost, to do a great deal of work, especially to a farmer or any country mechanic. One may be made to work a trip-hammer to a blacksmith's shop, drive a planer or saw to a carpenter's, or grind the meal, churn the milk, thresh the wheat and cut the fire-wood, for a farmer.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